THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

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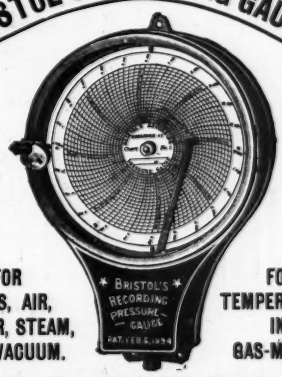

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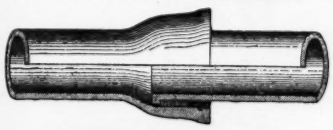

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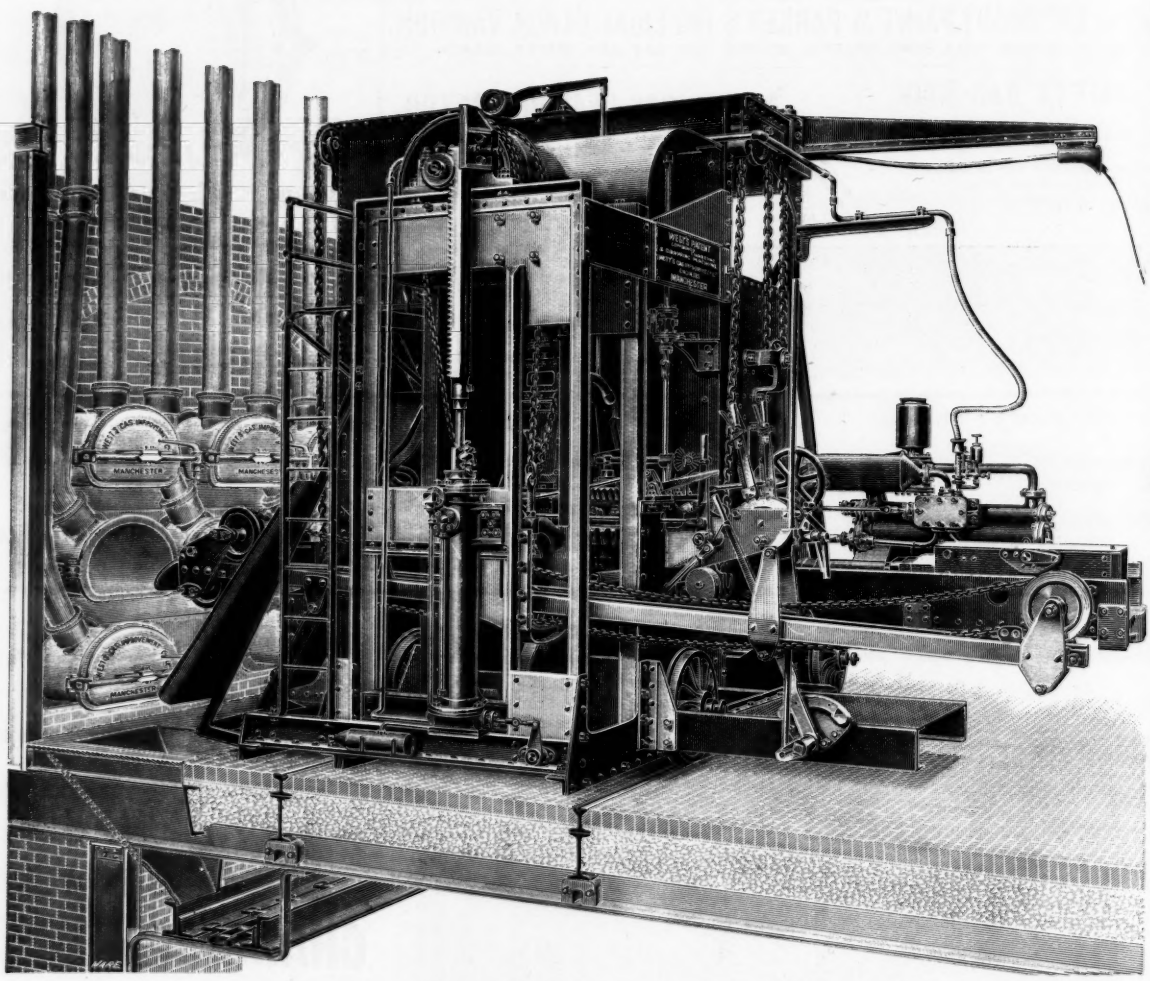

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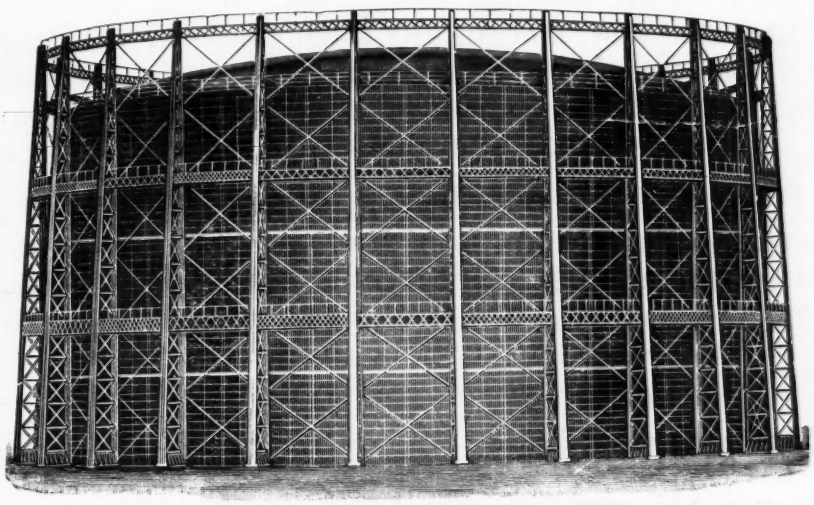

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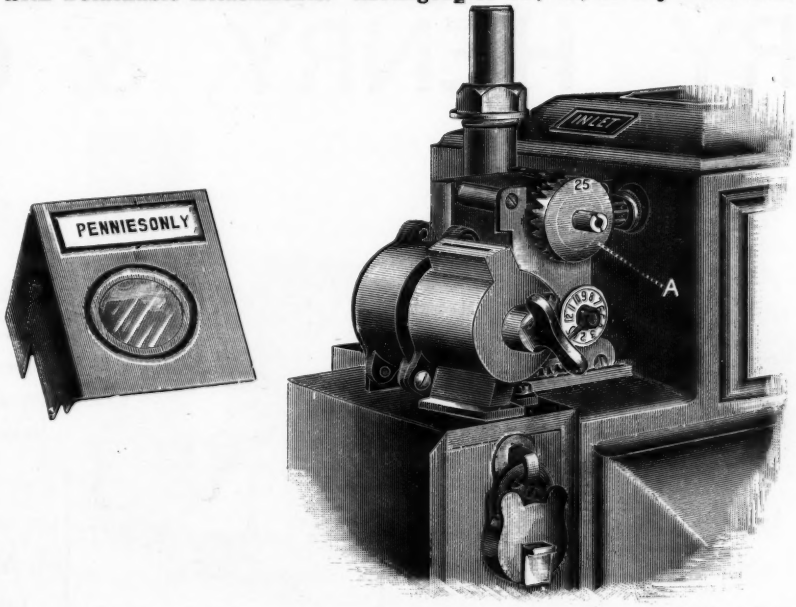

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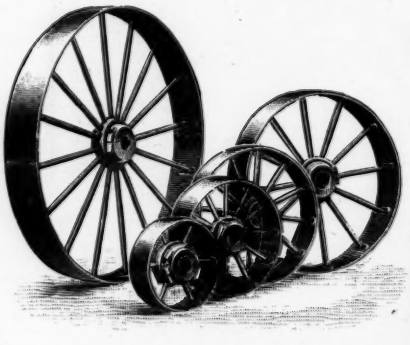

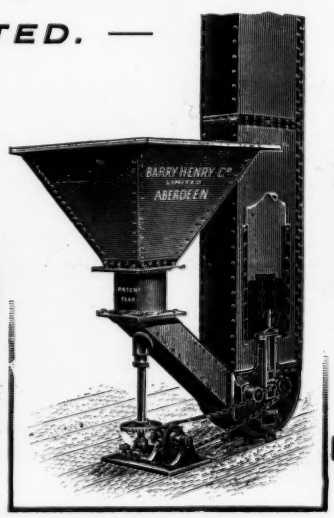

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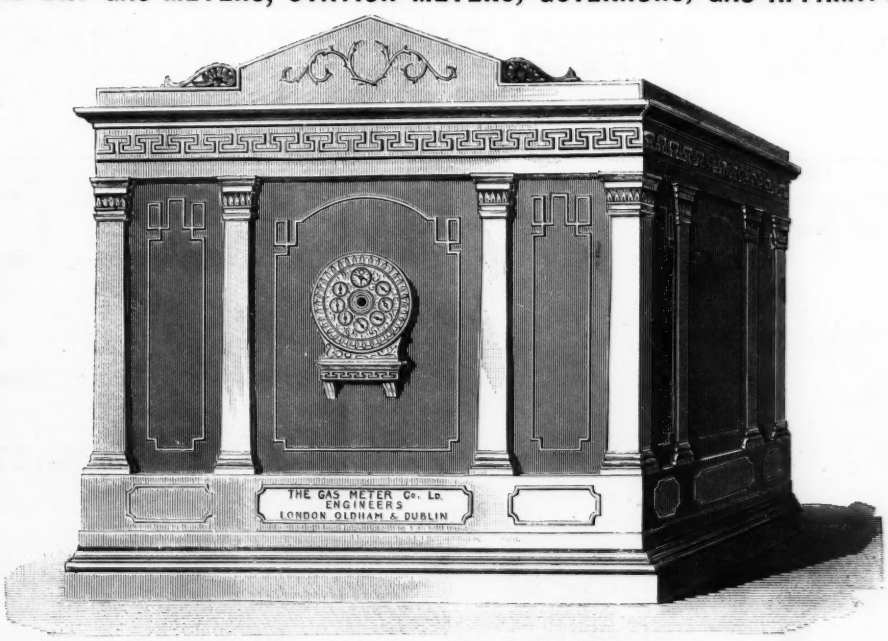

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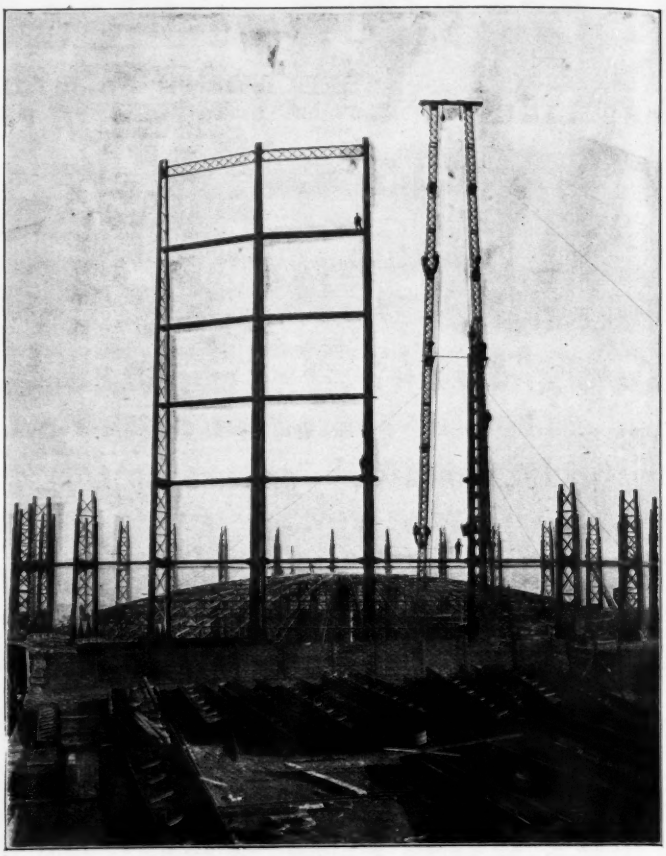

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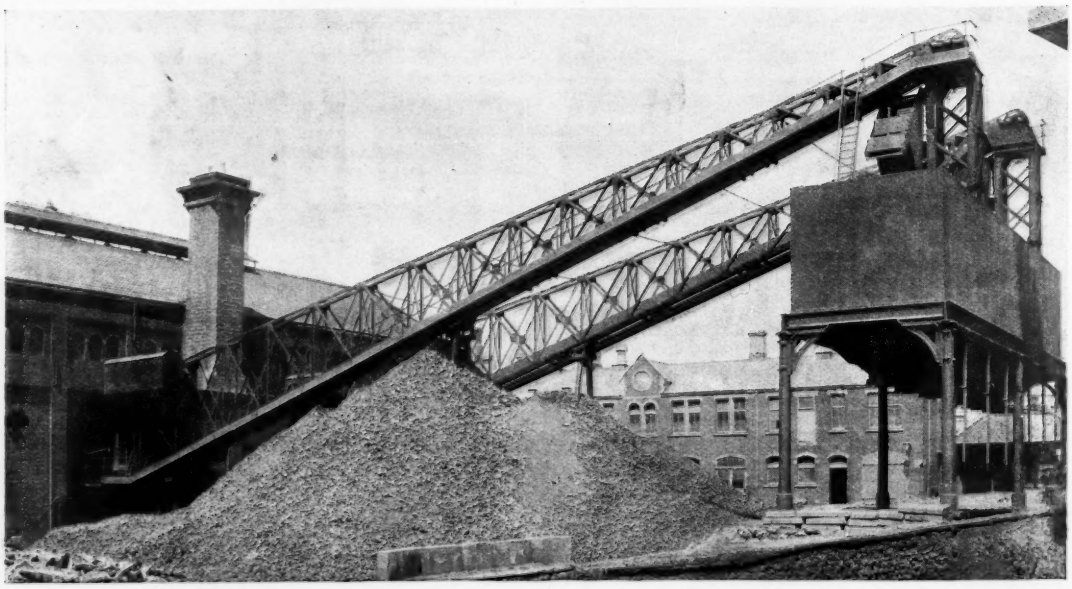

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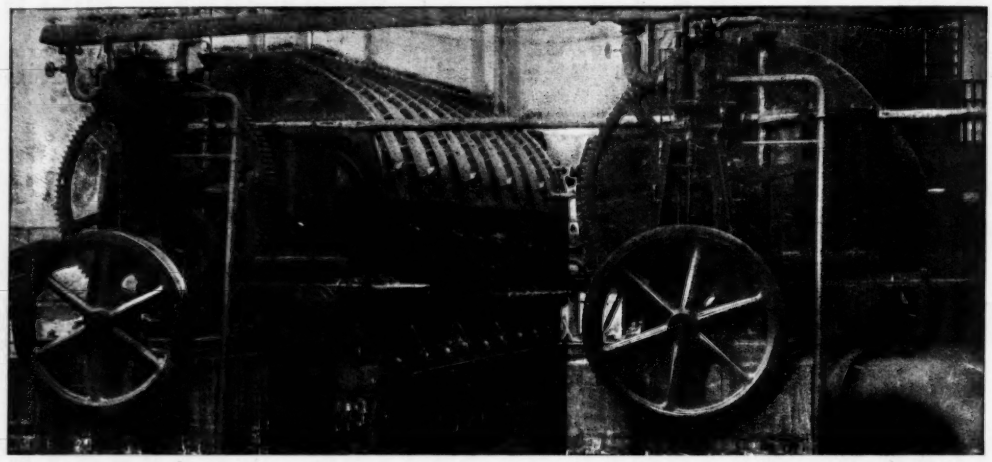

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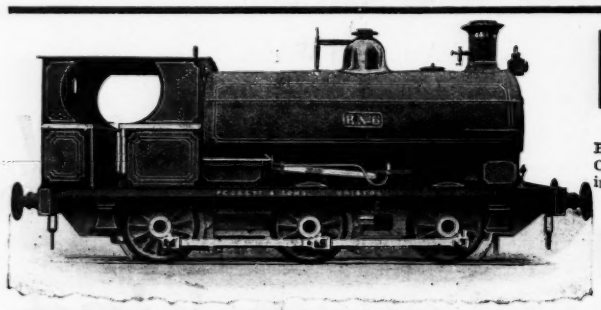

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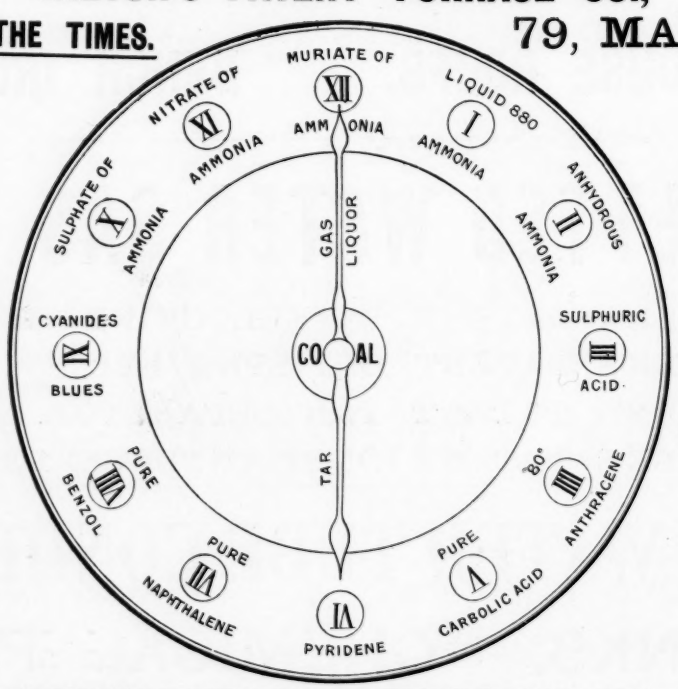

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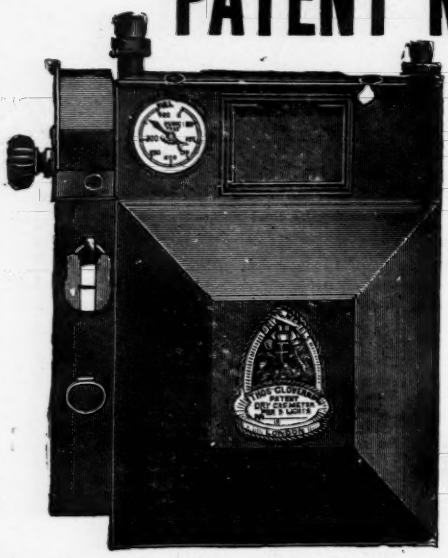

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VOL. LXXXI., No. 2080.—TUESDAY, MARCH 24, 1903.

EDITORIAL NOTES.

The Southern Association Meeting—Mr. Tysoe, and Naphthalene.

THE annual meeting of the Southern District Association of Gas Engineers and Managers was held at the Hotel Cecil on Thursday, when Mr. W. E. Price, of the Hampton Court Gas Company, relinquished the presidential chair, and was succeeded in office by Mr. J. Tysoe, of East Greenwich. The new President, enjoys a popularity with his fellows which his Inaugural Address, reproduced in another column, will distinctly enhance. Himself one of the most unaffected of mankind, without a suspicion of the assumption of personal importance which so readily besets the head of a large—a very large—works, Mr. Tysoe has the same easy bearing under his vast responsibilities at East Greenwich that marks his Chairman. Yet, as his friends in the North of England do not forget, Mr. Tysoe was not brought up in the South Metropolitan school of gas engineering. He is, however, emphatically the man for a big works; and his quiet talk on Thursday was a disclosure of the thoughts, and a statement of the experiences, of a works engineer whose duties are on a scale which is rarely equalled. He has to think in thousands of tons of coal, and in millions and tens of millions of feet of gas. His units are in themselves complete gas-works of the first magnitude; and his industrial judgments must be translateable in thousands of pounds.

This is really the key to Mr. Tysoe's address—it is a glimpse at gas management on the hugest scale. There is, of course, no virtue in mere size. Consequently, Mr. Tysoe did not waste his own words or his hearers' time in telling how many miles of railway he has at East Greenwich. Indeed, he sank all such considerations as far out of sight as possible, and spoke mainly of the purposes which all gas-works, large or small, have to subserve. Bigness, from his point of view, does not dispense with the obligation of efficiency. The mammoth is not necessarily a greater triumph of the action of natural forces than the ant. Every excuse that has to be made for an organism on account of its size is an admission of defect. One has the feeling, while following the Engineer of East Greenwich, that he has ever before his eyes the inexorable law of which he spoke—that "gas making is a business the essential feature of which is "that it must pay to run it." One understands that if the limit of efficiency for scale were reached at East Greenwich, the further growth of the establishment would be stopped. The megatherium must earn his keep, or make way for a better animal. His bulk will not save him. It is the law of Nature. One result of attending to Mr. Tysoe's remarks is to start a fresh inquiry in the mind as to what constitutes engineering. That Mr. Tysoe is an engineeer, none would dream of denying. That the work he does is properly engineering, is another proposition which is indisputable. But what academical or private test of engineering ability, other than the actual doing of the duty, would indicate the fitness of a man for such a post? Would any Faculty of Engineering that was ever founded or schemed, in connection with a University, distinguish by the grant of a degree the competency requisite to get the best possible return on the money spent at East Greenwich?

It is all so simple, too, to hear of it from the man who does it as his regular daily work! The engineer here stands self-revealed as the man who is able to do things—to get things done as they should be done. Where the engineering knowledge comes in, is in respect to the way of doing it. It is not chemistry, nor mathematics, nor acquaintance with the elements of physical science, that will enable the works manager to show profits. Amid all the modern advertisement of German scientific educational methods, it is astonishing that nobody remembered the German saying concerning German military engineers—that they are men who know everything, and can do nothing. The antithesis of "konnen" and "können" is one of the few points in which the German language favours the *jeu d'esprit*. Of course, the more an engineer knows, the better; but it is not mere knowledge that makes the engineer. This may appear a hard saying to some; but it is a true one.

Mr. Tysoe took the opportunity for declaring the faith that is in him as to the superior efficiency of horizontal retorts, with power stoking machinery, to inclined retorts, also with appropriate mechanism, in regard to carbonizing on the largest scale. His statement on this head is positive and unequivocal; and it must rest upon his authority. He has made himself responsible for the fixing of the standard of realizable efficiency and economy for the horizontal retort system; and he must stand by it. There was much that is very human in Mr. Tysoe's confessions and observations in relation to gas testing, smoke suppression, the popular ideas of the motives of gas companies, and the difference between the ways and ideals of gas-testing officials and those of the inspectors under the Alkali Works Regulation Acts. The range of his daily purview transpires again in the casual way in which he mentioned his experiences of Coroners' juries. It is not everyone who can classify inquests, and distinguish by his personal knowledge the principle, or the want of it, which operates in determining the character of the findings where a wealthy gas company is implicated! Altogether, it was an excellent address, well delivered.

We have not left much space for noticing the account given by the Honorary Secretary, Mr. J. W. Helps, of the progress of the naphthalene inquiry undertaken by the Association, as to which much interest has been created—not all confined to the geographical limits of the Association. The statement read by Mr. Helps was little more than a report of progress, coupled with a request for renewed authority to proceed with the investigation, which has now reached a stage when money must be spent if any good is to be done. That is to say, everything that can be arrived at by the method of putting questions to willing gas managers, and examining the answers, has been attained; and it is necessary that the further questioning should be experimental. The next steps will be from the known to the unknown; and there is hope that something may then be arrived at. The truth of the matter is not a large thing that lies across the gas manager's path; but it may have already shown its hiding-place.

Mr. Glasgow's Regrettable Resolution.

IT appears, from the tone of the letter that Mr. A. G. Glasgow has addressed to us, and which is published today in our "Correspondence" columns, that he has taken umbrage at our little protest against, and criticism of, the style he has adopted in the articles recently contributed by him on the subject of "Blue Water Gas at Ilford—and "Elsewhere." For a hard-hitter such as our correspondent undoubtedly is, his easy offence is rather surprising. In making the protest, on the publication of his second article, we can assure him there was no change of front on our part. On reading the first article, it was taken that the severity of the composition was intended by Mr. Glasgow to goad those who were pointedly named into a discussion of published statements as to the merits of competing water-gas systems; and to have doused the article with censure on its personal reflections would certainly not have contributed to that end. In saying this, perhaps Mr. Glasgow will accuse us of being journalistic "oppor-"tunists of the worst character." But now it appears that the purpose that we attributed to our correspondent, of making a bold essay at inciting discussion to arrive at "true facts," only occupied a secondary place. His first object was to stop the (as he has described them) "misrepresentations" of his trade rivals—"the Dellwik "promoters."

However, in his second article, Mr. Glasgow, not satisfied with implicating those named in his first charge, must needs go out of his way to make obscure suggestions of dishonourable action on the part of users of benzol enrichment; and, when he did this, the time had most surely arrived for

protest. Instead of promoting discussion, we know well that the manner of both the first and second articles has in some quarters had a contrary effect. We have not the slightest objection to calling "a spade a spade" when, in our opinion, duty demands it. But we do object to the columns of the "JOURNAL," under the guise of an effort to harmonize technical disagreement, being made the wrangling-ground of trade rivals. It is our desire, in such matters as this water-gas question, to encourage, for the behoof of all and to the full, the interchange of opinions, figures, and experiences; and to that extent all who are competent (as Mr. Glasgow and Mr. Dellwik eminently are) to add to the stock of knowledge will find a welcome in these pages. Mr. Glasgow still persists in not recognizing that the men who read the technical columns of the "JOURNAL" are something more than novices in gas matters, and are well able when the method in which costs are arrived at is stated (as in the Ilford article) to supply, on their own account, obvious deficiencies to make up the final cost. He may rest content that they—who are the men most concerned—are not likely to be lured into the "general acceptance" of any such bare statement that "plain water-gas costs only 3½d. or less" without exercising on their own account their knowledge and trained intelligence.

We are sorry that Mr. Glasgow feels so aggrieved with us that he announces his intention of withdrawing from the discussion. There is, in the present issue, ample material for his trenchant pen to deal with, without descending to personalities and innuendo. He will find a full statement of the costs of the working, since the time of installation, of the combined water gas and Peebles oil-gas plants at Cleethorpes; a further and fuller contribution from Mr. J. H. Brown as to the costs at Ilford; an exceedingly interesting statement by Mr. Sidney O. Stephenson as to his experiences, tests, and actual costs at Tipton; and a letter from "Cali-"faccion" charging Mr. Glasgow with missing "the chief "point," and calling for certain figures. All this surely is sufficient to keep Mr. Glasgow in the field; and it will be regrettable if he passes by this opportunity for pursuing the debate on the most profitable lines. The time is ripe for, as Mr. Brown puts it, a thorough "thrashing out" of the whole question. To assist in that praiseworthy operation, that gentleman has prepared at Nottingham a testing plant for a complete investigation of what is known in the profession as the "Lewes process;" and it is to be hoped that Mr. Glasgow will see his way to accept the cordial invitation extended to him to take part in those tests. The results of demonstration will do more than columns of reproach to settle the points in dispute. Mr. Glasgow may have accomplished his own particular present purpose; but we unhesitatingly say that his loss in the controversy would take from it much of its piquancy and value. We therefore hope he will reconsider his position.

The Competition of Electricity with Gas and Steam Power in Manchester.

THE pressing question of the forced competition of electric power with gas was illuminated again last week at the meeting of the Manchester City Council, when the state and the prospects of the electricity supply undertaking of the Corporation were gone into. It is never easy to get at the "true inwardness" of corporation business; and that of Manchester is no exception to the rule. Indeed, it is perfectly safe to lay down the proposition that there would not be so much prevalent distrust of the growth of municipal trading, if there were less of the "inner circle" about municipal methods generally. The recent history of the Manchester Corporation Electricity Department has been recounted in our "Electric Lighting Memoranda;" and when writing of the curious incident of the Chief Engineer to the department being directed to report upon matters which were supposed to have been duly confided to Dr. Kennedy's care, no explanation of the origin of this order was available. According to a statement by the Deputy-Chairman (Mr. Hesketh) last week, the reason for the inquiry was a decision of the majority of the Council refusing to sanction any borrowing powers for the purpose of hiring out motors with a view to the development of the undertaking. It thereupon struck the Committee that this decision was almost tantamount to a vote of want of confidence in their judgment of what was expedient for the conduct of the business; and they forthwith instructed their Engineer to report as to the demand for current, and the plant available for meeting it. When the report came, it thoroughly upset the ideas of the Deputy-Chairman; for it plainly showed that instead of having a lot of plant to spare, a large additional capital outlay for more plant was imperatively required. A situation was thus created which has not yet been cleared up, and as to certain obvious aspects of which we desire to preserve silence. The immediate outcome, however, has been a declaration by Dr. Kennedy that the assumed surplusage of plant is the fact.

Hereupon, naturally, the Electricity Committee have now returned to their point, and—fortified by the advice of Dr. Kennedy to get more trade somehow—they first propose a revised scale of charges for all supplies, and, secondly, to revive the request for a motor-providing loan. For lighting, the new scale is not too liberal. It offers the choice between 5½d. per unit, with a minimum charge of 9s. 2d. per quarter, or a fixed charge of £7 per annum per kilowatt of maximum demand, and 1¾d. per unit as measured by meter. This is one more desperate attempt to "square the circle," and to hold the balance evenly between users and providers of a commodity which cannot be stored. Consideration of its merit may be left to those who pretend that a municipality always serves its customers more cheaply than a trading company. For power supplies, however, there is a tremendous reduction. Users of motors for 48 hours a week and upwards are to get current to any amount at a level charge of 1d. per unit. The Council approved of the recommendation almost with enthusiasm, and they passed the executive resolution unanimously. So we ought before long to see the results of this, the boldest bid for trade in electric power ever made to a huge industrial community. There was some reference to the additional circumstance that the Committee would probably enter into five-years contracts with power users, in order to encourage them to effect new dispositions. The scheme is a revolution for manufacturing Manchester; and if the whole aspect of the city and its industrial suburbs is not consequently changed within a year or two, it will be the biggest *fiasco* in the history of the workaday world, not only for the Manchester Corporation, but also for electric power sold at a starvation price. Talk of electricity in bulk generation, and Niagara utilization! This offer undersells them all. It would be absurd to inquire if the performance can ever pay the Corporation. It may answer their purpose, like the Ship Canal, to which the scheme is economically similar. But the example may be meanwhile commended to those gas managers and directors who are troubled about taking a trifle off the price of gas for engines.

Progress of Gas Bills in Parliament.

TRUE to their reputation for businesslike despatch in dealing with Private Bills, the House of Lords made short work last week of the first of the crop of Gas Bills which had been arranged to "originate" in their House. The particulars of the settlements effected will be found in our parliamentary report. The only question of general interest that arose in connection with these proceedings was that of the quality of the gas to be henceforward supplied by the Plymouth and Stonehouse Company. The Company had contemplated asking for a reduction of their statutory illuminating power from 15 candles (at which it was fixed by their Act of 1894) to 13 candles, by simply repealing the operative clause of the old Act and substituting another with the lower figure inserted in it. This procedure left the method of testing as it was; but it enabled the opposition to raise the whole question of the expediency of the alteration, and whether there should be any compensation for it in a reduction of the standard price. Before the Bill got into Committee, however, the Company had thought better of their idea, and contented themselves with asking for a return of the illuminating power to the 14-candle standard prevailing before 1894, without alteration of price. The Corporation of Plymouth were satisfied; but not so the Stonehouse authority, who contended that there was no recent precedent for a statutory reduction of the standard of illuminating power of a Company's gas without corresponding diminution in the price. It was also argued that the proposal would entail a decrease of the calorific power of the gas, and that a test of this quality should be introduced. On the part of the Company, it was objected that so slight an alteration of the standard of illuminating power could not

be represented by any fair or workable adjustment of price; and that the effect on the fuel value of the gas would be negligible. This statement, which is absolutely correct, prevailed with the Committee; and the preamble of the Bill was accordingly declared to be proved. The Company accepted a clause directing them to supply without charge suitable flat-flame burners to consumers requiring them for the new grade of gas; and the advice may be hazarded that the Directors might well make a reality of this opportunity for removing a common source of consumers' discontent. Not, of course, that there is any notable difference between the actual and the prospective qualities of gas in question; but consumers' treatment of the gas they pay for and burn is often so unintelligent that any chance of effecting an improvement upon it is not to be missed by a Gas Company desirous of standing well with the public. If the Plymouth Company will force a knowledge of the benefit they are authorized to bestow on their consumers upon those who are likely to need it most, it is quite likely that local public opinion will be brought round to the conclusion that obtaining the Act of the present year is one of the best things the Company ever did.

The second readings of the various Bills affecting the Metropolitan Gas Supply duly came off last Tuesday night; the threatened opposition having subsided on the understanding that all these measures shall be laid before the same Committee. The only note of opposition heard on this occasion was uttered by the Deputy-Chairman of Committees, Mr. Jeffreys, who stated that he had been informed there is no precedent for the bringing-in of a Private Bill to revise a Gas Company's prices. This observation applied to the County Council's Bill relating to the Gaslight and Coke Company; but by reason of the understanding already mentioned, Mr. Jeffreys would not divide the House upon the second reading. It is a little difficult, in the absence of detailed information as to the grounds for this statement, to reconcile it with the history of ancient Metropolitan gas agitations. Speaking generally, one would have said that the existing institution of the sliding-scale of gas prices and dividends is a result of the persistent endeavours both of the Corporation of the City of London and the old Metropolitan Board of Works to revise the selling prices of the London Companies. Surely, it might be thought, this is the very thing these authorities (of one of whom the London County Council are the lineal successors) did for years! Possibly there is some technical difference in the procedure to account for what is otherwise an unexpected ruling.

Reported Further Rise in Thorium.

The prediction that was recently made in the "JOURNAL" that the price of thorium would very soon make a second and substantial step in its ascent has, we think it is safe to say, already come to pass. Notification was received in London in the middle of last week that on Friday there would be a 25 per cent. advance, which means that the price was to be put up on that day to £50 per ton. At the time we first referred to this matter, and announced the imminence of a rise, the market price of thorium was £32. The first leap upwards was to £40, and now (as stated) it has gone to £50. There is to-day a scarcity of purchasable thorium; and no one on this side—at all events, no one whom we have approached in regard to the matter—seems to know exactly what is happening in respect of the concession for monazite sand to which allusion was recently made. One report has it that already the concession has been secured in an American quarter, and that a considerable sum has been paid down to the Brazilian Government for the privilege of taking the sand. This is merely rumour; and it has not sufficient foundation for us to put it forward as a fact. Although we made every effort to get from official quarters information concerning the proposals of the Brazilian Government in connection with the proposed new concession, little success was the reward. But clear it is that the Government were desirous of getting a large lump sum down for the privilege of taking the sand; but this was a speculative risk that few business men would care to enter into, in view of the uncertainty as to what even a day may bring forth in the way of a new source of thorium. The monopoly of supply may not always be found on the shores of Brazil. However, for the time intelligence is scare; and the best that can be hoped is that when news does come it will be of a nature that will brighten the outlook. Brazil is favoured by its possessions of monazite sand; but that sand is badly wanted in other civilized parts of the globe. It may be remarked here that readers who are interested in the chemistry of incandescent gas lighting will find elsewhere in this issue an abstract translation of an article by Dr. G. P. Drossbach on "The Extraction of the Rare Earths from Monazite."

Trustees and Investments in Debenture Stock.

The necessity for vigilance on the part of Secretaries and Solicitors of Gas Companies in detecting changes in legislation affecting the finances of the undertakings with which they are connected is emphasized by the letter on the above subject from Mr. Arthur H. Cane, the Secretary of the Reading Gas Company, which appears in our "Correspondence" columns. It is generally known that the Debenture Stock Act of 1871 contained a provision to the effect that where trustees were authorized to invest trust funds in the mortgages or bonds of a company, the power thus conferred comprised the investment of such funds in the debenture stock of such company. Mr. Cane points out that the Act of 1871 was repealed by the Trustee Act of 1893 (56 & 57 Vict., c. 53); and this is clearly indicated in the schedule to the Act. Clause 5, however, contains a sub-section (2) under which a trustee having the power to invest in the mortgages or bonds of any railway company, or of "any other description of company," may, unless the contrary is expressed in the instrument authorizing the investment, invest in the debenture stock of a railway company "or such other company." It is of great importance that the powers of trustees in regard to the channels of investment open to them should be as widely known as possible; and therefore the thanks of officials of gas undertakings are due to Mr. Cane for pointing out the change above alluded to. It may, perhaps, be mentioned, as bearing upon the subject, that trustees have the power to invest in the debenture or guaranteed or preference stock of any incorporated company in the United Kingdom established for the supply of water for profit, who, in each of the ten years immediately preceding the date of the investment, shall have paid a dividend of not less than 5 per cent. per annum on their ordinary stock.

Leicester Lighting Departments.

The working of the Leicester Corporation gas undertaking for the twelve months to December has resulted in a net profit of £20,033, which is to be handed over towards relieving the rates of the town. Handsome as this sum is, it would have been considerably greater had it not been for the fact that a reduction of 2d. per 1000 cubic feet in the price of gas (representing £15,000) was made a year ago. It is, however, the opinion of the Gas Committee—and very properly so—that the consumers are entitled to a large share of the profits of the department, and that the claim of the ratepayers generally, as owners of the works, is amply recognized by the setting aside for them of the amount named. The action of the Committee in reducing the price of gas is a commendable one from a commercial point of view; but it is rendered even more praiseworthy when account is taken of the fact that the rates of Leicester are rising in a manner which cannot be regarded as other than serious. It was stated by the Mayor when introducing last week the estimates for the current year that during the past six years the population of the town has increased by 12 per cent., and the rateable value by 24 per cent.; while, on the other hand, the expenditure has grown by no less than 51 per cent. From these figures, it will be seen that the growth of the expenditure has been out of all proportion to the increase in rateable value. Such a state of affairs must necessarily spell an addition to the rates—and this at a time when trade is by no means flourishing, and there are four times as many empty houses in the borough as was the case a few years ago. Under these circumstances, it is not surprising that the Mayor should say he thought the Committees "lost sense of proportion at times," and so allowed their expenditure to grow faster than the town did.

And the Rates.

It is, of course, clear that the improvements continually demanded must be paid for; the hardship is that those who have no need for such luxuries should be compelled to contribute

in precisely the same proportion as those who clamour for them. This contribution at present amounts to 7s. 5d. in the pound; but it is confidently predicted that within a year or two it will have risen to 8s. One member of the Council stated that he had been a great deal among the small shopkeepers, on whom the rates were a very heavy burden; and "he found there was often very little difference between them and those people who had to live out of the rates at the workhouse." Though the rapid growth of the financial obligations of our municipalities generally is without doubt one of the most alarming aspects of the existing system of local government, there is, of course, nothing peculiar in the experience of Leicester in this respect; and the only object we have in mentioning it here is to emphasize the self-denial of the Gas and Electricity Committee in handing to the gas-consumers, by means of a reduction in price, a sum which would have made so comfortable a contribution to the rates. This, however, does not complete the tale of their wisdom, for they also decided not to hand over to the ratepayers the profit of £5499 which has resulted from the electricity works—urging that the money should be kept to provide for renewals, as they do not yet know the life of the plant and machinery. The Leicester Gas and Electricity Committee, and their Engineer (Mr. Alfred Colson), are to be congratulated upon the sound financial policy pursued in connection with the undertakings under their charge.

Competition at Wrexham.

As we have already remarked, the "ratepayers' burden" is found to be a heavy one at very many places besides Leicester. The Wrexham Gas Company, for instance, expect this year to have to pay about 9s. 4d. in the pound for local rates; and in their case additional bitterness is imparted to the impost by the knowledge that they are assisting to support a competitor in the shape of a municipal electric lighting undertaking which is kept going by the aid of their and other ratepayers' contributions. This, of course, under existing conditions, is by no means an uncommon position for a gas company to find themselves in; but such a reflection is sorry comfort for the sufferers, and the sooner an alteration in this respect is made, the fairer it will be for all parties. The intimation we were able to give last week as to the likelihood of an early move being made by the Board of Trade with a view to improving the present state of affairs, affords some ground for hope that the interests of gas companies and others who do not use electricity, may be safeguarded from being called upon to provide financial assistance for municipal electric light undertakings, by the drafting of some clause of general application. In addition to their lighting competitor, the Wrexham Gas Company are threatened with a motive power competitor, in the shape of the North-Western Electricity and Power Gas Company, who are promoting a Bill in the present session of Parliament. But in the event of this measure becoming law—and it is threatened with considerable opposition—the Wrexham Gas Company may find their new antagonist no more harmful than the Corporation electric light installation has hitherto proved itself to be in preventing the continued growth of their business, especially as the Company are doing their best, by means of a concession in price, to increase the use of their gas for power purposes.

The Coal Commission.—The proceedings of the Royal Commission on Coal Supplies during the past week were of special interest to people engaged in the gas industry from the fact that Sir George Livesey appeared before the Commissioners on Wednesday, and Mr. W. J. Crossley and Mr. Carl Dellwik on the following day. Sir George dealt with the progress of the gas industry for many years past, and recounted the various steps taken, and the economies effected in the consumption of coal by the increasing use of water gas and of incandescent mantles. Mr. Crossley furnished particulars in regard to the construction and use of gas-engines, and the fuel economy effected thereby, both as regards the quality and the quantity of the coal consumed. He said the gas-engine could work with half the coal used by the best modern steam-engines. Mr. Dellwik described his process for manufacturing water gas, and pointed out the economies to be anticipated from its use. Dr. E. Hopkinson, of Messrs. Mather and Platt, followed Mr. Dellwik, and set forth the comparative merits of steam and gas engines for driving dynamos.

WATER AFFAIRS.

Supervision of Water Supplies in France.

The all-important subject of the protection of sources of water supply from contamination has been occupying the attention of our neighbours on the other side of the Channel; and last Tuesday week the Academy of Medicine in Paris had before it an interesting report by M. Roux upon the local and medical supervision of the sources which are now being looked to for supplying the growing needs of the French capital. They are subjected to close scrutiny by engineers and bacteriologists in the municipal service; and for more than two years there has also been medical inspection. This service is under the direction of MM. Martin and Thierry, who have associated with them medical men practising in the localities in which the sources are situated. The moment a case of dysentery or typhoid fever is reported to them, they communicate with head-quarters in Paris, and at once have placed at their disposal the antiseptics necessary for the disinfection of the under-linen and *dejecta* of the patients. Moreover, they take every precaution against any pollution of the water by pathogenic germs. This system of supervision has the twofold advantage of protecting the localities subjected to it and the Metropolis itself. Among numerous examples of its efficaciousness, the reporter cited that of the small town of Cerisiers, situated in close proximity to some of the sources of water supply in the valley of the Vanne to which attention has been turned with a view to their utilization. Last year, just after the occurrence of several cases of typhoid fever, it was considered highly probable that the disease had been propagated by the water from a wash-house, which had been discharged into the street, and had reached the underground water through fissures in the earth. In conjunction with the central authorities, the Municipality at once undertook the works necessary for ensuring that the water should no longer be a source of danger to those immediately depending upon it, or to the larger number of people to whom it was in contemplation to supply it. It need scarcely be stated that the occurrence of the outbreak was sufficient to cause the authorities in Paris to exclude, at all events provisionally, Cerisiers and its vicinity from their list of available sources of water. The water may be greatly needed, but it must not be taken so long as there is the least chance of it being the vehicle for the propagation of disease.

Not only is supervision necessary at the sources of water supply, but almost at the point of distribution. For the past three weeks Parisians have had served out to them what has been described as an "unnameable liquid," which the authorities nevertheless are good enough to call "potable "water." Last Wednesday, one of the municipal councillors, M. Hénaffe, put a question on the subject to the Prefect of the Seine. He asked whether it would not be possible to apprise the public, by means of placards and through the medium of the Press, of every change made in connection with the distribution of water in the capital; and he thought the inhabitants should also be recommended to have the water boiled or filtered before consuming it, as the matter was one affecting the public health. The Council received the proposition, and decided to consider it on some future occasion—possibly after mischief has been done. It appears that early this month there was a great rise in the River Avre, with the result that its waters became charged with earth and sand, which imparted to it a most repulsive yellow colour. At the same time, a prominent official in the Water Department is responsible for the statement that this was in no way detrimental to its salubrity, and that, as a matter of fact, the bacteriologists had not found in the water more than the usual number of microbes. This, at all events, was reassuring. For a few days the water from the Avre was shut off, and replaced by a supply drawn from the reservoir at St. Cloud. But this was quickly exhausted; and then the river, which sends about 13¼ million gallons of its water daily into Paris, had to be again resorted to. Happily, however, about the time M. Hénaffe was making his complaint, the reports from the sources were more favourable; it being stated that the water was coming in pure. As, however, it had to travel close upon a hundred miles before reaching the capital, it was not till towards the close of the week that the inhabitants were able to quench their

thirst with a truly limpid liquid. Bad as the water supplied to London has been stated to be, it has never been sent out in such a condition as that which has lately caused so much dissatisfaction in Paris, where things are supposed by many to be done so very much better than they are on this side of the Channel.

ESSAYS AND REVIEWS.

THE GAS AND WATER STOCK MARKET.

(For Stock and Share List, see p. 780.)

THE condition of affairs on the Stock Exchange seems to be going from bad to worse; and the slackness of business which has for too long already been the lament of the markets reached a lower level perhaps last week than has often been touched. The general tendency, too, was wretchedly flat, sparsely relieved here and there by an upward flutter. Prices almost all round, from Consols (which were as bad as any) downward, show a shrinkage, and only the Americans made a decent show. With so little to do in Capel Court, it is no wonder the attractions of brilliant weather and outdoor sport conspired to thin the attendance. The Money Market was fairly easy, though inclined to be a little firmer towards the close; and the Bank rate still remains unchanged, much to the chagrin of those who contend that it might have been lowered some time ago. Business in the Gas Market again showed a disposition to fall off in point of volume; and the aggregate of transactions was to a large extent confined within the limits of one or two leading issues. Judging from what takes place almost weekly in the Mart, it would seem that by far the greater part of all the gas stock dealt in in London changes hands there. In the Exchange, the tendency was rather unfavourable, as the only two undertakings in which there was any appreciable amount of dealing receded slightly in quotation. In Gaslight and Coke issues, the ordinary opened without any sign of recovery from its flat tone at the close of the previous week, and was pretty active at first, maintaining its position for half the week. But then it grew weaker; and after marking as low as 81½ more than once, it closed a shade firmer. Hardly anything was done in the secured issues, only one or two parcels changing hands at cheap figures; and the debenture quotation had to recede. South Metropolitan opened well at 120½, but soon began to show signs of giving way; and it went from bad to worse, until the final bargain marked only 117½. Commercials were very quiet; but the last prices were the best of the week. The Suburban and Provincial group were hardly dealt in at all, and quotations underwent no alteration. Transactions in the Continental Companies were as limited as in any other group; but prices at least did not show any sign of giving way. The remoter undertakings were quite devoid of feature. The Water Companies were as somnolent as usual; but there was a little more movement in prices. Southwark issues of all sorts, which frequently take an independent line, had an appreciable fall.

The daily variations may be very briefly summarized: On Wednesday, Gaslight and Coke debenture fell 1. On Thursday, Gaslight ordinary and South Metropolitan fell 1 each. On Friday, South Metropolitan fell ½. In Water, Southwark fell 3, ditto "D" 5. On Saturday, Southwark "A" debenture fell 2.

ELECTRIC LIGHTING MEMORANDA.

Waste in Electricity Supply—Unsatisfactory Meters—Consumers' Complaints—The Nernst Lamp.

IT is well to bear in mind the fact that the wastage of central station electricity supply still remains very large in proportion to the energy registered and paid for on consumers' meters and by the public arc lamps. Electrical engineers at their Institution meetings, and the writers on technical matters in the electrical journals, always have many interesting topics to discuss; and the bulk and variety of these professional papers produce the natural effect of creating an impression that there are no longer any gaps or weak places in the central station supply system, or, if any remain, that they are very small and insignificant. How far this impression may be from the truth is made evident by certain figures relating to the working of one of the newest of the Metropolitan undertakings of this kind—the South London Electric Supply Corporation, Limited, whose station results are instructively dissected by a friendly contemporary. The disclosure does not give one a very high opinion of the economics of the system. It is remarked, in introducing the subject, that the distribution losses of the earlier alternating current systems amounted to about half the total units generated. This, it may be observed, is believed to have been the experience of the Metropolitan Electric Supply Company, who began business on the most approved American model of the day—going the length of having one of their London generating stations equipped throughout with American plant and machinery. All this has long been a thing of the past, and no wonder. It will be remembered that in those days the high-pressure alternating current was taken to the consumers' door, and everybody had to accommodate his own private transformer on the premises—a circumstance that occasioned some startling experiences.

The whole system of distribution was re-organized, and larger transformers were brought into sub-stations, which arrangement had the effect of reducing the waste of current to something over 27 per cent., of which 16·8 per cent, was represented by loss in feeding mains and transformers, and 10·5 per cent. represented the energy dissipated by the distributing low-pressure mains and meters. Matters then seem to remain at this stage. The South London Electric Supply Corporation, being only a new concern, escaped the painful experiences of the older companies, and, it is to be presumed, enjoy the further advantage of possessing a distributing system of the best modern type and of ample capacity. Yet the following were the supply statistics of the Corporation for 1901: Units sold to consumers and used for public lighting, testing lamps, and other commercial and works purposes, about 1,011,000; expended in distribution by batteries, motor alternators, feeders, and transformers, including 10,429 units not accounted for at all, 277,760 units. This leaves only 733,240 units (72 per cent. of the output) usefully available, and showing a wastage of 28 per cent. It does not strike one as a notably economical way of using fuel. It appears that the consumers' meters remain troublesome go-betweens in this business, They notoriously create apparent losses by reluctance in starting. Very few makes of the article can be depended upon to start with one lamp, whatever their size, after having been up for a year; so that it is found very necessary in practice to change all meters every two or three years. How well this compares with the life of the much-abused gas-meter! Many ingenious expedients have been suggested for correcting this short-coming of the usual direct-reading electricity meter—among others that of relieving it of a portion of its indicating work, and allowing it to read "watt-hours," or something else which the inspector who calls to take the registration would have to calculate from in order to arrive at the amount of the bill. But it is recognized that the consumer would not like to be treated in this way. Even when the public have complete faith in the honesty of their tradespeople, they like to know what they are buying, and to be able to check their bills. The majority may be too careless or preoccupied to take this trouble regularly; but that is a different thing from not being able to do it in any circumstances. We never could understand why electricians should expect to enjoy a fuller measure of public confidence in their good faith as retailers than is either extended to or expected by other dealers in produce.

As a matter of fact, what lately happened at Taunton is sufficient proof, if any were needed, that the public are not satisfied with a system of charging for a supply of electricity by meters which do not measure reliably. It may be perfectly fair for the rental department of an electric light undertaking to adjust consumers' accounts by putting on an arbitrary 10 per cent., or other reasonable proportion suggested by experience, to compensate for the use of single lamps which do not start the meter, and so forth. But it is an abuse of language to call this charging by meter. Far better give up the idea, and fall back upon the simple plan of charging so much a lamp per annum. Meanwhile, it is unfortunately true that the fancy of electricity suppliers of "advanced" views turns in the opposite direction; and they are all for "demand indicators," and other expedients to "make the punishment fit the crime" of such of their patrons as do not come up to their ideal of consuming practice. The usual result is, bills that the consumer cannot possibly check, and which he not infrequently disputes. When a bill for electricity suddenly, and as it may appear unaccountably, jumps up to three or fourfold the usual figure, it is no wonder if the consumer objects. It is, as the experience of gas-rental officials abundantly illustrates, always difficult to convince a consumer of a metered supply that he has almost certainly had what he is charged for. He is apt to forget between quarter-days the series of parties or the spell of sickness which necessitated the burning of lights for long hours day after day. If he has been absent from home in the interval, he is prone to regard this circumstance as a complete answer to the suggestion that the lights must have been going for an unusual time; altogether forgetting that the ways of servants and caretakers in this regard are not necessarily as his ways.

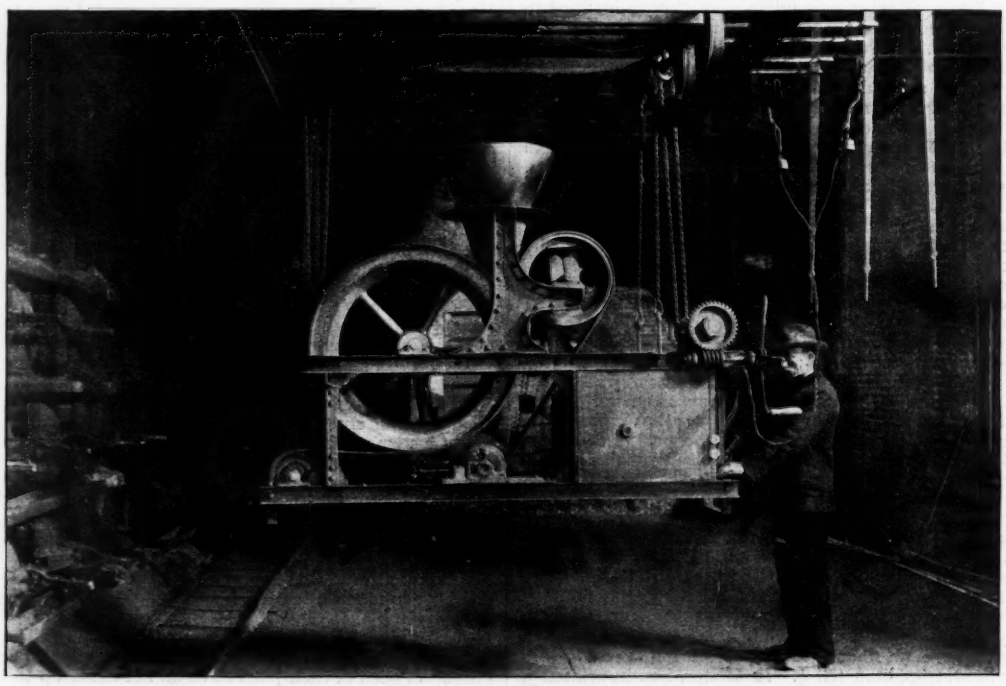
It seems to be the general opinion of electricians that it is about time for the Nernst lamp to "make the spoon or spoil the horn." The commercial reputation of the lamp has been kept under protection long enough. Hitherto the only information available respecting its performances has been supplied by experts who have worked under laboratory conditions. It appears to be the understanding that the halving of the cost of electric light, which was promised as the reward of users of the Nernst lamp, has not been realized, owing to the cost of renewing the luminous element, which has to be done after from 50 to 200 hours' use. It saves current, and appears to be less affected by those variations of pressure which the best-laid systems of electrical distribution occasionally fall into—provided that the pressure does not rise too high. It does not well stand the repeated turning on and off of ordinary use, and the structural details are not satisfactory.

A VISIT TO M. de BROUWER AT BRUGES.

A New Charging-Machine of Original Design.

It was with very great satisfaction that we found an opportunity presented itself for accepting an invitation kindly extended to us by M. de Brouwer (whose inventive genius has become known to "Journal" readers through his extensively adopted conveyor) to visit the city of Bruges, for as, if not in exact words, he remarked in effect, when his genial invitation was given, "I can show you there many reminiscences of bygone ages, and also I believe one of the latest inventions of importance in connection with carbonizing methods." With such a dual attraction, excuse for not visiting Belgium there could not be; and as the mass of notes gathered during the visit, full as they are of interesting point and pith are now surveyed, and the mind wanders over the time spent in M. de Brouwer's company, the pleasure experienced in anticipation of, and during, the visit comes back with increasing intensity. This is not the place to speak of the old-time wonders of Bruges; but, in the exercise of our duty to the gas industry, it is the place to speak of those things which were seen within the walls of the works over the operation of which the ingenious Gas Engineer of Bruges presides, and one of which things may be of far-reaching service to the gas industry.

The stretch of sea that divides M. de Brouwer from this country permits us to speak of him with less reserve than propriety would allow if our subject resided in our midst. Unassuming and reticent regarding his own doings, a man of many accomplishments, but (even beyond his sixtieth year) first a student—and an ardent one too—of all that pertains to his own profession in respect both of policy in management and methods in manufacture, diffusively read even to the degree of a knowledge of the last published news on English gas matters—and there we have M. de Brouwer from the side on which we feel no hesitation in speaking of him. In the Bruges works, the fruit of his brain is seen here, there, and almost everywhere. It is not his fault nor that of the Company (MM. Desclée & Cie.) who own these among other works, that they are not in parts what neither the engineer nor the proprietors would wish them to be. The Bruges works are carried on under the uncertainties of a concession, which is fast running its course; and while the prospect of a renewal is good, there must always be the unsettling and capital-subduing contingency ahead. Therefore, it is the system (and not the men) that is responsible for the little disappointments experienced in some respects on first entering the Bruges Gas-Works. But to the gas engineer and to the chronicler of information for the profession, there is much that recompenses in important constituent parts of the works. But even in the less attractive portions, something of the ingenuity



Reproduction of a Photograph of the De Brouwer Charging-Machine at Bruges.

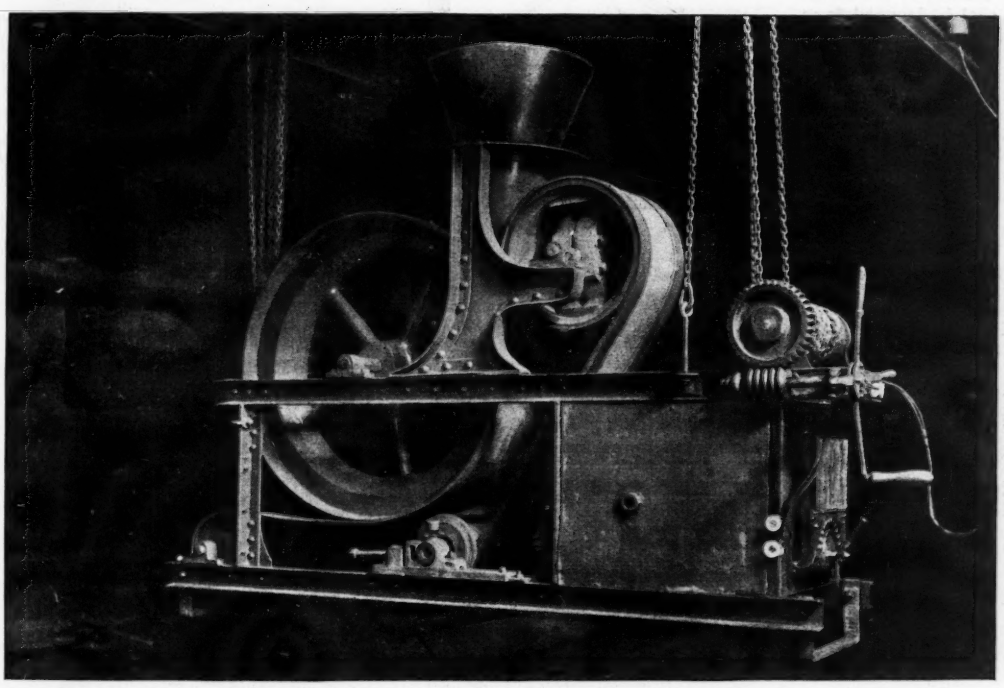
displayed in the latest additions are discernible throughout. That ingenuity has been brought to bear upon the design of simple and comparatively inexpensive plant, from which the maximum productive return is secured for the outlay—that is to say, the aim has been the cheapest production attainable on a low capital outlay; and, in the course of a second article, it will be shown that success has attended the effort.

It is intended in the present article to concentrate attention on the latest of M. de Brouwer's inventions, which is the one that largely influenced the trip to Bruges. Modesty, it has been mentioned, is a prominent trait of that gentleman; and, until the visit to Bruges, that modesty had kept from us all but such indication of the nature of the invention as was afforded by the patent specification, and all information as to its efficiency in performance. That it was a retort-charging apparatus, and that the principle of operation was the projection of the charge into the retort, and not its conveyance and deposition as in the present well-known types, was, of course, within our knowledge.* Here in this principle of projection we have a radical and original departure from present mechanical methods of dealing with retort charges; and this being the case, it was M. de Brouwer's desire that, before any extended notice was made of the apparatus, its construction should be independently inspected, and its operation and capabilities witnessed under ordinary working conditions, and then for judgment to be pronounced upon it. Hence the visit to Bruges. It will incite the further interest of the reader to say at once that the points with which, while in the Bruges retort-house, we were prominently impressed, apart from the unique action of the apparatus, are its simplicity, the fewness of the working parts, and consequently of the parts that will be subject to wear and tear, the ability to deal with retorts of various lengths and sections, the cheapness of installation, the speed of operation, and the efficiency under the conditions (which will be explained in the course of the article) of its working at the time of the visit. All of these features will be brought out in the course of the article, in which it will be better perhaps to sketch first the line of thought that led M. de Brouwer to turn his attention to evolving a new method of mechanically charging retorts, then to describe his machine, following with a few particulars concerning his retort-house and methods and conditions of working, and finally to give an account of the operation of the machine, in doing which some points which may not have been previously noticed will be brought to light.

Following this scheme, it is necessary to first briefly sketch the past history of mechanical stoking, in order to unfold to view those points in present systems that M. de Brouwer regards as their weaknesses, and which he has sought to overcome, and he believes successfully, in and by his new invention. Those of our readers who have studied the history of stoking machinery as related in "King's Treatise on the Manufacture of Coal Gas," and since the time of the publication of the work in the "Register

* An illustrated abstract of the English patent specification was given in the "Journal" for Aug. 26 last, p. 569.

of Patents" in the "JOURNAL," will know how numerous inventors in every civilized land have attacked, from almost every conceivable side, the problem of how to lighten, or to supersede altogether, the labour of charging horizontal retorts; and yet it is remarkable how few distinct types of machines have been evolved. It may be assumed that the original tool used for charging was the shovel—an instrument which, when guided by the skill of the stoker, deposits its layer of coal by a series of small quantities added intermittently. An imitation of this process has been the leading idea in many inventions; and the shovel method may therefore be called type number one. To this type belong, with more or less closeness, the machines of Warner, Ross, Fiddes, Arrol-Foulis, and others; and the one which departs most from this type is the only one successfully employed to-day. The second step in the evolution of the mechanical charger was made when the scoop method of charging by hand was introduced. The scoop may therefore be called type number two; and to it belong by far the greater number of attempts to solve the problem of mechanically charging retorts. The machines of Green, Robinson, Yates, Foulis (early machine), Woodward, West, and Bronder, besides many others, were and are all scoop machines of type number two. It may be said that, generally speaking, the scoop machines all place their coal in the retort in a satisfactory manner longitudinally; but, in a greater or less degree, they leave the coal heaped up over the centre of the retort transversely and thin at the sides. The inventors who use a large scoop going into the retort but once to make a charge, have invariably found their machines to be failures, owing chiefly to the impossibility of getting good carbonizing results from coal so unevenly distributed across the retort. But those who have more closely followed the type by accomplishing the charge with a smaller scoop passing into the retort twice—turning over the first time to the one side and the second time to the other—have to an extent mitigated what many gas engineers have frequently, when comparing the machine-placed charge with the shovel-charge by a skilled man, pointed out as a defect of the former. However, there is without doubt (notwithstanding what has been done) room for improvement in getting nearer the ideal distribution of the charges in gas retorts. Curiously enough in the case of type number two, as in the case of class number one, the machine which departs most from the type—West's short double-scoop machine—makes by far the nearest approach to the ideal layer in the retort; and this accounts for the excellent results generally attained with it. But, unfortunately, the machine is, in practice, suited only for manual power. This question of the distribution of the charge in the retort is one of the points that M. de Brouwer had in view in setting out to consider the whole question of the possibility of improving the principle and practice of mechanical stoking. The principle on which the machines are constructed, it will be seen, he regarded as the cause which produced the transversely defective layer; and therefore the principle itself called for change. While he does not, so far as we gather, profess (without further experience) to have attained to the perfect charge under all conditions, his daily working at Bruges—with the machine he has devised, and with the coal he is using there—shows that the charges are very evenly distributed both across and lengthwise of the retorts; and



AN END AND NEARER VIEW OF THE MACHINE AT BRUGES.

so, in his particular circumstances at all events, we can bear witness that he has achieved one of his objects.

The idea of using some form of plate or push-plate conveyor has also had a little attention, and may be called type number three. One machine of this kind was, it is understood, only recently working in Germany. But to those who have had any experience of charging machinery, the idea of using any system of jointed links, plates, or mechanism, in that portion of the apparatus which goes into the retort will certainly not recommend itself. Even the simplest form of scoop, it must be admitted, is a source of trouble and wear and tear. Retorts will get out of shape in course of time, and will bulge inwards or (say) downwards sooner or later; and when this happens, of course, any kind of rigid mechanism going into the retort is something to be avoided. Type three consequently has not met with great success. Here, again, is found another point to which M. de Brouwer gave consideration—that is to say, the keeping outside of the retorts of all parts of the charger. The lessening of the parts, the cheapening of apparatus for mechanical charging, and other points in connection with stoking machinery were also matters upon which he bent his practical mind in considering this question of making a new charging-machine.

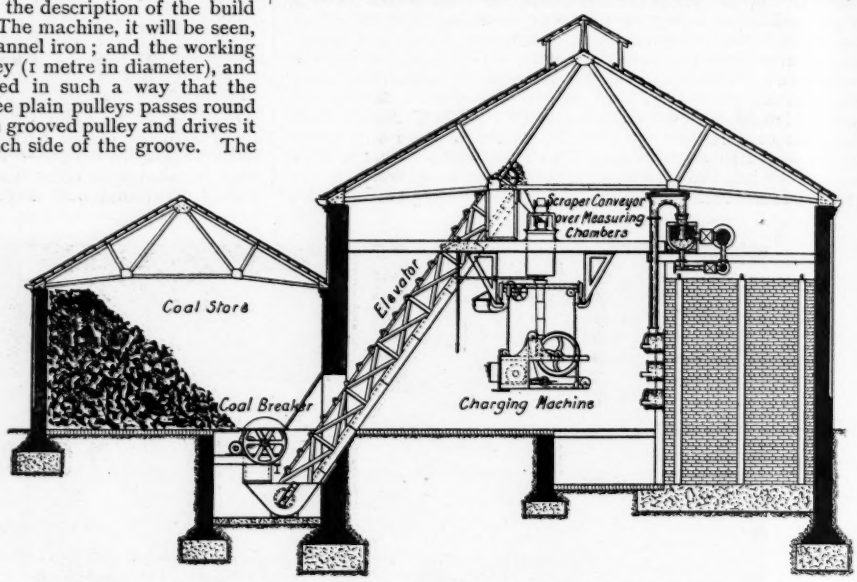
However, his conclusion was that projection and not conveyance was what was required to surmount the objections to existing types of machinery; and he is not the first inventor who has arrived at the same conclusion, and faced the same view. The centrifugal fan or pump has formed a type to some half-dozen inventors who have been impressed with the desirability of keeping all the mechanism outside the retort. For twenty years, at any rate, the idea has persisted, as is shown by the records of the Patent Office. Yet a moment's real consideration of the problem along the right line would have saved hours of thought and much money. Coal is not a fluid like water, and pressures in it are not transmitted equally in all directions. The fundamental error lies in the fact that nine out of ten men, when asked the way a free particle, revolving on the circumference of a disc would tend to fly off, would reply "along a tangent," whereas the fact is it would fly off radially. Even when the particle is propelled in a circular course by fans, as water is in a centrifugal pump, the direction only bends towards a tangent until it reaches the resultant between the radial direction and the normal to the curve of the point of the vane. Coal, therefore, when fed into the centre of the revolving propeller, like that of a centrifugal pump, simply dashes against the casing and comes to rest. Only a few odd pieces go out at the proper place; and the machine rapidly becomes a disintegrator, or chokes and stops. Therefore, what may be described as type number four, which is the one that gets farthest away from the old idea of mechanically conveying the coal into the retorts, offers, up to this particular point, little prospect of success.

The foregoing is only presented as a comprehensive résumé of all types of charging apparatus which have so far been proposed, tried, or used, to show some of the considerations that weighed with M. de Brouwer when he devoted himself to the designing of the new apparatus which, in conformity with the scheme of this article, has now to be described. It is understood that the

intention is to name it the "D.B." coal-projector; and it will be agreed that the term "projector" is an apt one, and will distinguish it from all other types of charging-machines on the market—in fact, the machine has the distinction of standing in a class alone. On first seeing the machine in the Bruges retort-house suspended from a carriage running upon rails overhead, and noting its simplicity as the inventor describes it and explains its operation and effective performance, it is difficult to screw one's belief up to the credulous pitch; and, if it were some men speaking and not M. de Brouwer, there would be a strong desire to give expression to one's feelings of disbelief. But, when afterwards, through his courtesy, the actual working and results are demonstrated, it must be said that the excellence of the character in regard to performance of the first specimen of the machine that was suspended before us during the time he was describing its construction was fully borne out.

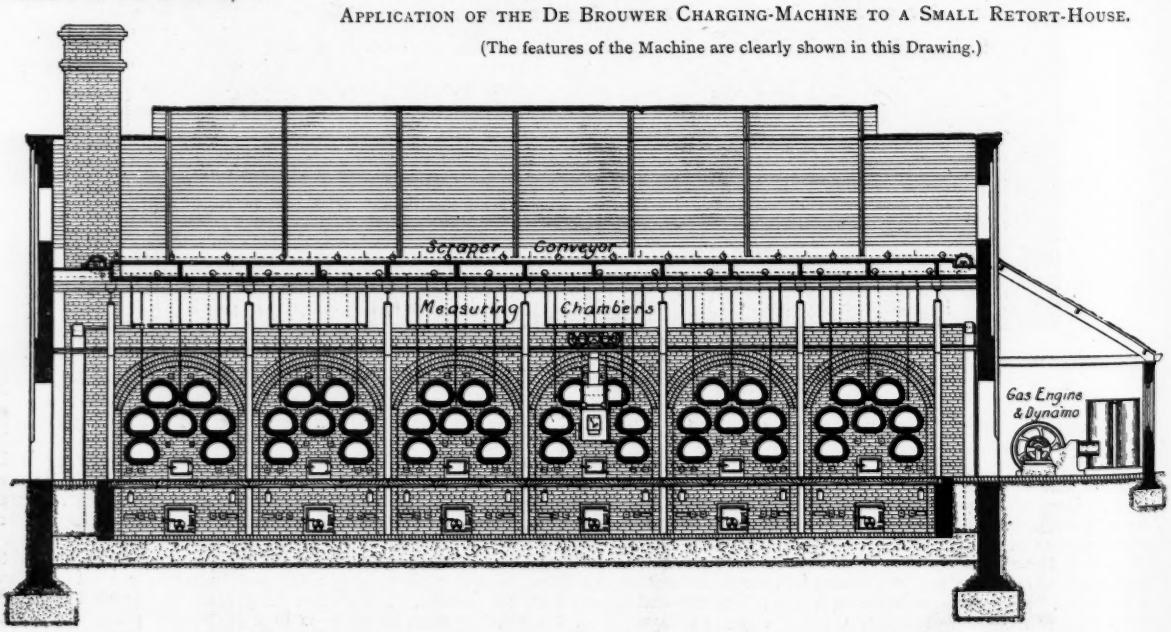
The photographs and drawings which accompany this article will assist the reader to understand the description of the build of this unique piece of apparatus. The machine, it will be seen, is constructed in a framework of channel iron; and the working parts consist of a large grooved pulley (1 metre in diameter), and three smaller plain pulleys, arranged in such a way that the endless band running round the three plain pulleys passes round a portion of the circumference of the grooved pulley and drives it by the flat portions extending on each side of the groove. The groove is deep and wide in proportion to the size of the coal to be used, and, when the belt has been set in motion by a suitable motor, the coal is dropped from a feeding-shoot into the groove of the pulley, and is kept from flying off by that portion of the belt which encircles the latter. The coal very rapidly takes up the velocity of the belt; and its centrifugal tendency keeps it pressed against the belt when the latter takes a horizontal course and leaves the pulley. The belt travels a short distance horizontally, and then bends back round a plain pulley. But the coal keeps the straight line, and, finally, flies direct into the retort—just (and this is the best similitude that occurs at the moment) as a stream of water shoots from a fire-hose. The driving power required is very small, and can be supplied by any type of motor—such as a gas, steam, compressed air, or oil engine, continuous rope, or by that most convenient method electricity, which is the form of power employed at the Bruges Gas-Works.

There are several applicable variations in the method of supplying coal to the machine. The first and apparently the simplest one is to have a series of measuring-chambers supported on cross girders, and fed from a small push-plate conveyor; there being then a chamber over each vertical row of retorts. This is the system at Bruges; and in that case, the charging-machine is suspended—by an ordinary chain-block at the front end near the retorts, and by chains passing over a simple worm-geared hoisting gear at the back—from a carriage running on rails supported from the overhead cross girders carrying the measuring-chambers. The machine in that case—and this again is the system at Bruges—would usually be propelled by hand; a push being all that is necessary.



APPLICATION OF THE DE BROUWER CHARGING-MACHINE TO A SMALL RETORT-HOUSE.

(The features of the Machine are clearly shown in this Drawing.)



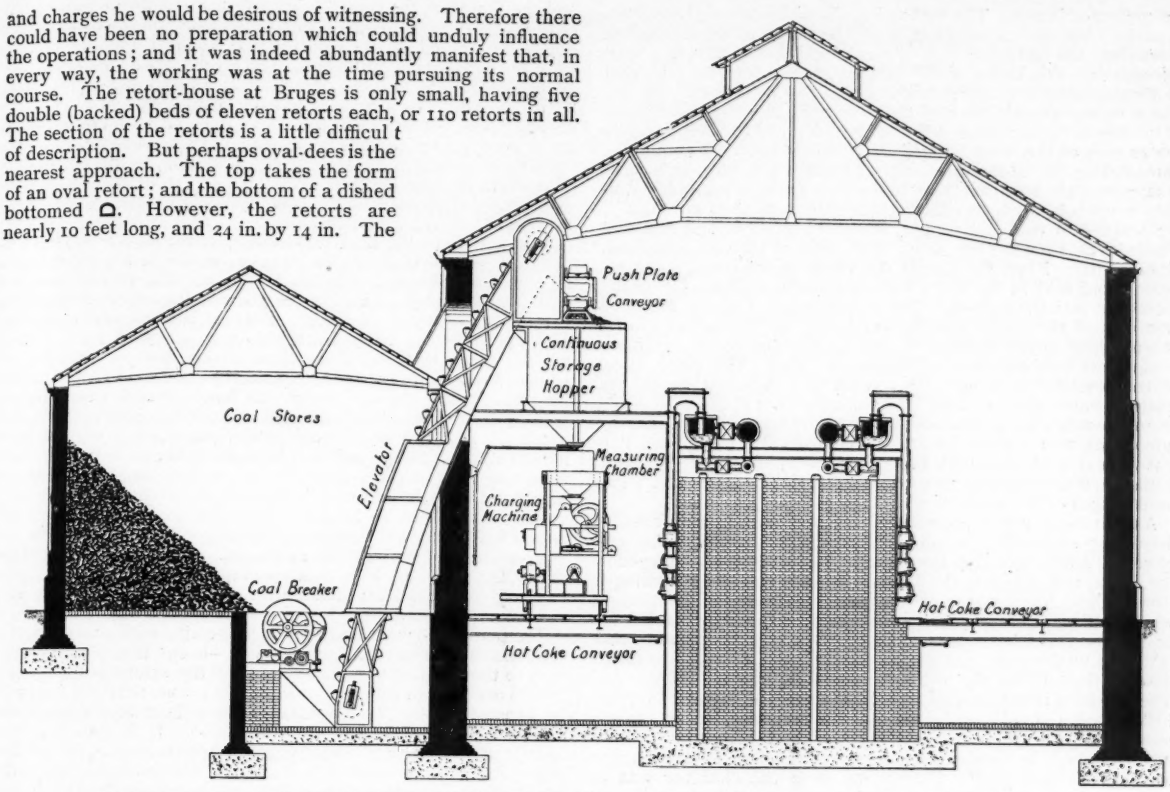
APPLICATION OF THE DE BROUWER CHARGING-MACHINE TO A SMALL RETORT-HOUSE.

(Showing the Overhead Coal-Feeding Arrangements, and the Gas-Engine and Dynamo House.)

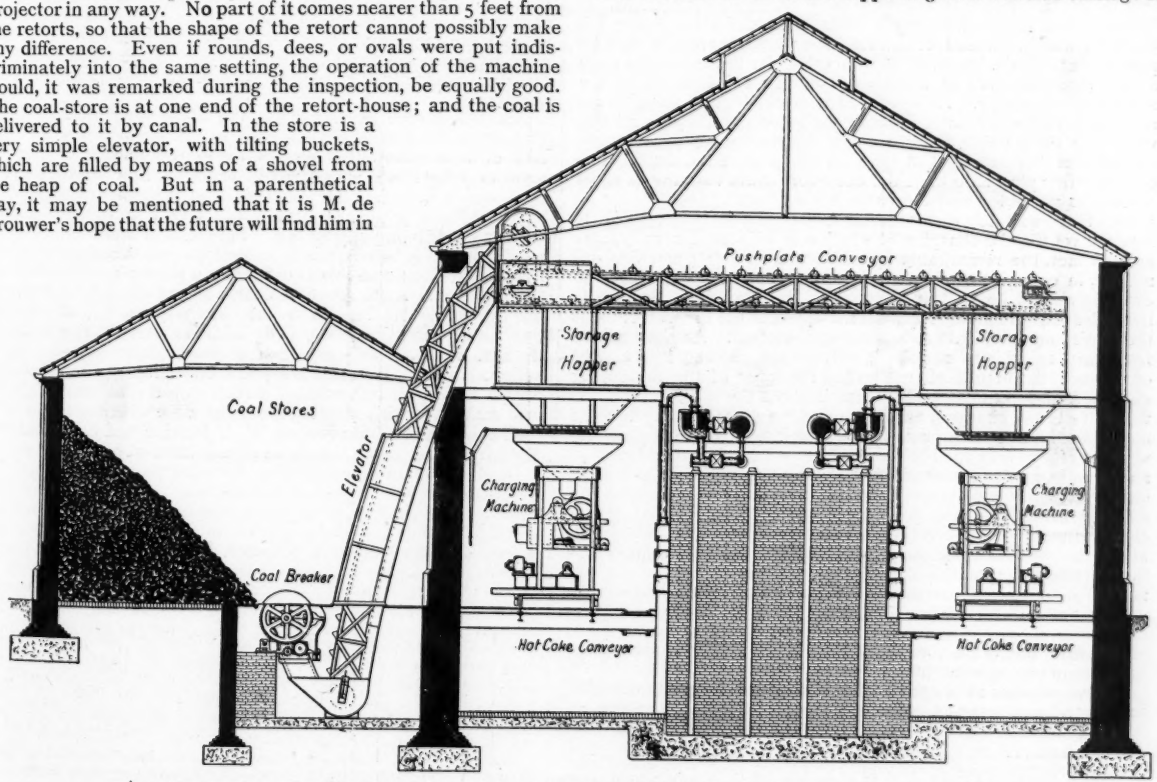
In longer houses, a propelling motor could be employed; and a continuous storage hopper would then also be preferable over the measuring-chambers, or the machine itself could be made to carry a measuring-chamber and be fed from the hopper. In cases, however, where a low first cost of elevating plant is of great importance, in comparison with a saving in labour afterwards, the machine can be made to run on rails laid in the retort-house floor, and have a frame into which a large hopper could be built at the top, so as to carry a sufficient supply for about fifteen retorts. This hopper would then be filled at intervals from a small storage hopper, supported on girders in the well-known way. In this case, the machine would have a motor for propelling it along the rails. As the hopper would be fixed, and the charging apparatus is light, the hoisting from tier to tier would be but light labour, even if done by hand. In the case of the example seen at Bruges, the hoisting from tier to tier is accomplished by the chain gearing. This is a sufficient general description; and it shows that the machine is applicable to all the varied circumstances of retort-houses. In fact, it may be said, that the limit of the capability and applicability of a single machine is only defined by the walls of the retort-house in which it happens to be located.

Now it should be mentioned, before proceeding, that beyond the knowledge of the day that the writer would arrive in Bruges, M. de Brouwer had not the slightest idea as to which of the draws

and charges he would be desirous of witnessing. Therefore there could have been no preparation which could unduly influence the operations; and it was indeed abundantly manifest that, in every way, the working was at the time pursuing its normal course. The retort-house at Bruges is only small, having five double (backed) beds of eleven retorts each, or 110 retorts in all. The section of the retorts is a little difficul t of description. But perhaps oval-dees is the nearest approach. The top takes the form of an oval retort; and the bottom of a dished bottomed ⏛. However, the retorts are nearly 10 feet long, and 24 in. by 14 in. The arches look somewhat peculiar. They are 12 ft. 6 in. centres; and the retorts are arranged in the beds in three tiers—with three retorts in the top horizontal row and four each in the middle and bottom rows. The regenerators are of M. de Brouwer's own design, and are admirably suited to his circumstances. Prior to dealing with the conditions under which the machine works at Bruges, it will be convenient to point out here that the shape of the retort cannot possibly influence the resulting work of the projector in any way. No part of it comes nearer than 5 feet from the retorts, so that the shape of the retort cannot possibly make any difference. Even if rounds, dees, or ovals were put indiscriminately into the same setting, the operation of the machine would, it was remarked during the inspection, be equally good. The coal-store is at one end of the retort-house; and the coal is delivered to it by canal. In the store is a very simple elevator, with tilting buckets, which are filled by means of a shovel from the heap of coal. But in a parenthetical way, it may be mentioned that it is M. de Brouwer's hope that the future will find him in possession of a fixed elevator with means for automatically filling from the boot. However, as it is, the elevator delivers into a small scrape conveyor—not more than 10 inches wide—at a suitable level, and running longitudinally from end to end of the retort-house over the measuring-chambers which supply the machine. These measuring-chambers are carried by girders across the house from buckstay to wall; and underneath are fixed the rails on which the supporting four-wheeled carriage for



APPLICATION OF THE DE BROUWER CHARGING-MACHINE TO A HOUSE WITH 20-FEET THROUGH RETORTS.
(This Section shows a proposed fixed Continuous Overhead Coal-Hopper with a Measuring-Chamber on the Machine, running on Rails in the Floor of the House.)



APPLICATION OF THE DE BROUWER CHARGING-MACHINE TO A HOUSE WITH STOP-END RETORTS.
(This Section shows the Proposed Arrangement of Separate Hoppers, with a fixed Hopper carried on the top of the Charging-Machine, which also runs on Rails in the Floor of the House.)

the projector is run. The measuring-chambers are of 3½ to 4 cwt. capacity; but the variations that can be made in the method of supplying the machine are several, and have already been referred to. The slides of the measuring-chambers are operated at Bruges from the retort-house floor-level by levers. On the slides being opened, the coal drops into the funnel-shaped shoot at the top of the machine, which directs it on to the belt and into the groove of the large wheel. It is M. de Brouwer's practice, immediately any of the measuring-chambers are emptied, to have them replenished, so that there is always a six hour's supply available overhead—six hour charges being his method of working.

Speaking of the coal supply, it should be explained that that which M. de Brouwer was using at the time of the visit was a soft French coal. From the supply the whole of the large lumps are picked and sold in the city; and that which remains is nothing more nor less than slack. But at the same time, it must be stated (and the point was demonstrated by the inventor) that the machine is not limited to coal in this powdered condition. It can deal with any coal of reasonable size. The large wheel of the machine at Bruges is grooved to a sufficient depth and width to carry coal of about 4 inches cube; but it can be grooved to any practicable dimensions. The soft French coal, it may be interesting to mention, intumesces considerably; but nevertheless from it at Bruges, with the 3 to 3½ cwt. charges of six-hours' duration, from 10,000 to 10,500 cubic feet of gas are made. The total output of the works is about 150 millions a year.

As has been noted previously, the projector in this case is driven by electricity; a 4-brake horse power motor being enclosed in a box formed in the frame. The current is conveyed to the motor, and from it to the dynamo, by means of trolley carriages running on a bare copper conductor hanging under the girders which support the measuring-chambers. The dynamo (of 12-horse power) is located in a room near the exhauster-house, and is driven by the same gas-engine—a Crossley, of 25-brake horse power—that drives the exhauster, pumps, two conveyors, &c. The whole of the electric plant is quite a small affair, and occupies little space, and yet it serves not only the projector, but an electric motor for operating the coal elevator and conveyor, six arc electric lamps in various parts of the works, fans for the smithy, and other small work. During the time the charging was in progress there was not an opportunity of inspecting the indicator to ascertain the current required. But later on with the machine running idly, it was observed that the finger of the indicator slightly oscillated in the region of 12½ ampères at 108 volts; and when the coal-elevator was being worked, the indicator oscillated between 17½ and 20 ampères, at 110 volts.* The electrical plant, it will be remembered as having already been mentioned, is not absolutely essential to the working of the projector; any other available form of power being equally applicable.

Now, we have described in a circumstantial manner all the main points gathered about the new machine in the course of the inspection; and the next point is as to its performance in the charging of the retorts. The retorts are drawn in the ordinary way by rakes. But incidentally it may be observed that M. de Brouwer has in mind a simple form of machine for doing the work, by which, instead of drawing the spent charge, it will be pushed out. This, however, is something for the future, as soon as the circumstances at Bruges will enable the idea to take a more definite shape. However, in passing, too, it may be remarked that the system of drawing the retorts is unique; all the work of a draw being done in about five to ten minutes—every available stoker being set at work on this part of the duty. The object of this plan is to have the coke-conveyors running as short a time as possible; and the same arrangement goes on now as before there was any idea of using a charging-machine. This is how the retorts the charging of which was witnessed were drawn; and, in fact, the remarkable speed of the charging machine demands, in order to attain the highest degree of speed, that the drawing should be well in advance of it. However, the retorts being drawn, the machine was placed opposite the first retort; and the movement of a little switch set it in motion. As soon as the necessary speed was acquired, which was achieved in a matter of seconds, the man in charge pulled the lever of the measuring chamber, and in 12½ seconds (which is about the average time) the first retort was charged, and the machine placed ready for the next retort. The time occupied in charging some of the retorts was carefully noted. Five were charged by the one machine and man in 1 min. 25 sec., with the utmost smoothness and without the slightest difficulty. From the considerable experience he has had with the machine, M. de Brouwer estimates that it can charge any number of retorts, provided the drawing is well ahead, at the rate of four a minute, or 240 an hour; and his demonstration satisfied us that this remarkable speed is attainable—at any rate (not to commit ourselves too precisely) wherever the conditions are on all-fours with those at Bruges. Even where the conditions are not favourable to this great speed of operation, it shows that the utmost rapidity that is attainable under other conditions can be secured.

It was peculiar to see the coal squirting out from the machine in a broad and compact stream straight and direct into the retorts, without dropping anything between the point of ejectment and the mouth of the retort. On arriving inside the retort, the coal strikes the floor, slides along to the end, piles up to a certain depth determined by its velocity, and finally covers the retort from the end to the mouthpiece. The layer is made under exactly similar conditions to those obtaining in an inclined retort; and it may be said is as near as is possible level from end to end and side to side. Variations in the size of the coal, as is known, have great influence on the charging of inclined retorts, because the velocity of falling is greater or less according to the proportion of small in the sample; but, in the "D. B." projector, this makes no material difference, as the velocity is always the same—being determined by a positive drive.

The action of the coal on entering a retort was seen by a demonstration which M. de Brouwer made in the charging of an open 20 feet length of hydraulic main. The charge was not quite level throughout its length; there being a little thinness at the far end of the sham retort. But this is easily accounted for. The speed of the Bruges machine was provided for a 10-feet retort; but it is really more than is required for that length, while it is not quite—though very nearly—sufficient for the 20-feet length. A little increase and it bids fair to charge 20-feet retorts with precisely the same evenness that was noticeable in the 10-feet lengths. This is a great consideration; and let us suggest what it means. A machine that can be made to charge a 20-feet retort from one side means a great saving in cost of installation—in machines, in overhead coal-hoppers, and in elevators and conveyors, as well as in labour. All these are points which are bound to be recorded as features that impressed us while watching the operation of the machine at Bruges. With the dummy 20-feet retort, too, M. de Brouwer illustrated the capability of the machine to carry coal of quite 4 inches cube satisfactorily, and to its very extreme end.*

The point as to wear and tear in connection with new apparatus—particularly retort-house machinery—is one that is always present to the mind of a gas manager; and the extent of the liability of this machine to suffer in this regard is one that will naturally be inquired into. The opinion formed from the opportunity afforded for observation may be useful. It is that the wear and tear will be of comparatively small moment. In the first place, it will have been remarked that the projector offers this great advantage—that no part of it goes near enough to the retorts to get hot, and no mechanism enters the retort to damage it, or, in turn, to get overheated or crushed out of shape. From a careful examination of the machine, it is difficult to see any part other than the belt that could, in (with present experience) a measurable time, get out of order; and even that M. de Brouwer estimates will stand a year's good, hard work before needing renewal, which would be merely a moderate expense, and a renewal which could be effected by the works' hands. At first, the inventor tried an ordinary plain belt; but he found that the edges soon stretched; and so he has reinforced the portions of the sides of the belt which work on the flat parts of the periphery of the large wheel on either side of the groove. He now finds that the grip is perfect; and any little slackening that may arise in time can be taken up by a tightening-screw arrangement at the side of the machine. The belt, in fact, is the only active part exposed to the wear and tear of the coal; the groove in the wheel merely performing the humble duty of acting as a guide to the charge.

Another matter bearing upon the same question is the fear that engineers frequently entertain in connection with the adoption of new plant, that something in the nature of improvement may be made which would excel the first production. In this case, however, there need be little apprehension regarding any inordinate expense which would result in the event of any improvement being introduced. The parts in which improvement would (if at all) be effected it is obvious are those which are the least expensive; and this is distinctly a strong point in favour of the machine. As to the first cost, nothing definite can be said; but the whole machine is so comparatively small and unpretentious in construction, comprising such few parts in the whole, that its first cost cannot—although a power machine—be a very serious matter. But this is a point on which gas engineers can obtain their own information direct, as we understand that the sole makers for this country (as is the case with the same inventor's conveyor) will be Messrs. W. J. Jenkins and Co., Limited, of Retford, whose name stands as a guarantee of careful work.

Now, in conclusion, it will be observed that we have here said nothing but what is good of the machine; and this arises simply from the fact that, as it was seen working at Bruges, nothing else could be said of it. The prospects of an apparatus of the kind, we believe are considerable, and the advantages to the gas industry great; for it is a well-known fact that, even small gas-works now experience increasing difficulty in getting a supply of stokers properly competent to charge retorts so as to get good results. A power apparatus of such a simple character as that here described can require no great amount of skill to handle, and will, moreover (as we have confidently indicated), be procurable at a price which will bring it within the range of even the small retort-house, rendering the skilled stoker quite unnecessary therein. We believe the new machine—being (although of such

* These figures and those given on another point are supplemented (from a letter received from a correspondent) in a paragraph at the close of this article.

* Since the visit, Messrs. W. J. Jenkins and Co. have informed us that they have now one of the "D. B." coal-projectors in operating order at their Retford works, and that they are able by it to charge cold retorts, 20 feet long, with every possible success.

simple form) a complete departure from all existing methods of mechanical stoking—worthy of the journey made to secure the material for this article, and of the space devoted to it. Now it will be of interest to see who will be the first to adopt the invention in a British gas-works.

[Subsequent to the above article being put in type, an English gas engineer, who was present with the writer at the charging of the Bruges retorts as described, states that he saw the same retorts drawn in the evening. He found the charges lying fairly evenly along the floor of the retorts—in fact, much more so than he had anticipated. The condition was practically the same as those inspected in the morning. He also took the time occupied in charging twelve retorts; and he found it was, on this occasion, six minutes. But, he adds, "the charge was kept back to some extent by the men who were doing the drawing." He also made some further particular inquiries regarding the consumption of electricity. At the time of his second visit, the whole of the machinery operated by electricity, as mentioned in the article, was running, including the electric arc lamps. The pressure was then about 117 volts, with from 65 to 70 ampères. When the charger was shut off, the pressure dropped somewhat, and the ampermeter indicated 50 ampères. M. de Brouwer told him that his total consumption of electricity for twenty-four hours, including all the machinery and the lighting, was 8 kilowatts.]

In a second article, a few notes will be presented on one or two other portions of M. de Brouwer's works and some of the methods that have been adopted in connection with the outside department. Although the notes will not supply anything so original and fresh as the main subject of this article, they are of interest as showing some little variations from ordinary practice in this country.

THE QUESTION OF FORGED POWERS OF ATTORNEY.

THE decision of the House of Lords in the case of *Starkey v. Bank of England*, dealing with the question of liability for loss due to stock or shares being transferred under a forged power of attorney, appears to us the only possible one. The appellant is a stockbroker, who in 1897 required the Bank to transfer to his firm certain stocks standing in two names jointly, tendering as his authority so to transfer the stock a power of attorney purporting to be assigned by the two stockholders in question. The Bank transferred the stock accordingly; it was subsequently sold, and the proceeds were paid to one of the original joint holders, upon whose death an action was brought against the Bank by the other joint holder—whose signature had been forged to the power of attorney—claiming to have the stock replaced in his name. The Bank served the appellant with a third party notice for an indemnity; and Mr. Justice Kekewich gave judgment for the plaintiff (see *Oliver v. Bank of England*, 71 L. J., Ch. 388) against the Bank, and held that Starkey was bound to indemnify the Bank. Starkey appealed; but the judgment was upheld in the Court of Appeal, and has now been confirmed by the House of Lords. The principle on which the case was decided was laid down forty years ago in *Collen v. Wright* (27 L. J., Q. B., 215), in which it was stated by Mr. Justice Wills that the obligation arising in such cases is well expressed by saying that a person professing to contract as agent for another impliedly, if not expressly, undertakes, or promises the person who enters into such contract upon the faith of the professed agent being duly authorized, that the authority which he professes to have does in fact exist. It is a question of deceit; and if deceit be proved, the deceiver—however innocent of intent—is liable to the party deceived. This reminder of the principle laid down in *Collen v. Wright* may be useful to some share registrars of joint-stock gas and water companies.

OBITUARY.

The death occurred a few days ago, in his 81st year, of Mr. F. HYLAND, head of the firm of Messrs. Lewis and Hyland, of Ashford. During his lifetime deceased took a keen interest in everything tending to the benefit of the town; and he was Chairman of the Ashford Gas Company when the undertaking was acquired by the Local Authority.

One of the old fire-clay manufacturers of the South Staffordshire district has just passed away in the person of Mr. G. A. TROTTER, who lately succumbed to an attack of pneumonia. Though he had reached the advanced age of 85, he took an interest in the business of his firm (Messrs. Trotter, Haines, and Corbett, Limited, of Stourbridge) till quite recently, though his health had been failing for a year or two. He resided at Stourbridge for a considerable time, but the latter part of his life had been spent at Wolverley, where he was buried last Saturday week, the 14th inst.

PERSONAL.

At the annual meeting of the Aberystwyth Gas Company held on Friday last, Mr. HENRY WOODALL, M.Inst.C.E., was elected Managing-Director.

We learn that Mr. F. G. COCKEY, Assoc.M.Inst.C.E., has resigned the appointment of Engineer and Manager of the Swindon Gas Company's works.

Mr. J. W. HELPS, the Engineer and General Manager of the Croydon Gas Company, has been elected a member of the Committee which the Croydon County Council have appointed to draw up a scheme for the administration of the new Education Act in the borough.

At the Llanwenarth Baptist Chapel last Thursday, the marriage was solemnized of Mr. D. W. DAVIES, the Manager and Secretary of the New Tredegar Gas and Water Company, and Alice Augusta, younger daughter of the late J. Prosser Jones, Esq., Inspector of Mines, of New Tredegar.

Mr. SYDNEY FRANCIS, the Engineer and Manager of the Gas and Water Department of the Clacton-on-Sea District Council, has extended his responsibilities by accepting the position of Joint Managing Director (with Mr. George D. Moffat) and Consulting Engineer to Moffats Limited—the makers of the well-known Lucas lamp.

At a special meeting of the Torquay Town Council last Thursday, a letter was read from Mr. W. INGHAM, the Water Engineer to the Corporation, resigning his position owing to his appointment as Hydraulic Engineer at Port Elizabeth, South Africa. He expressed his thanks for the support that the Council had given him during the seven years he had been in their service. Mr. Ingham was previously Assistant Water Engineer at Plymouth, under Mr. Sandeman, and he went to Torquay early in 1896. It is expected that he will leave England towards the end of May. Regret was expressed at his approaching departure, especially in view of the Corporation Bill in Parliament this session.

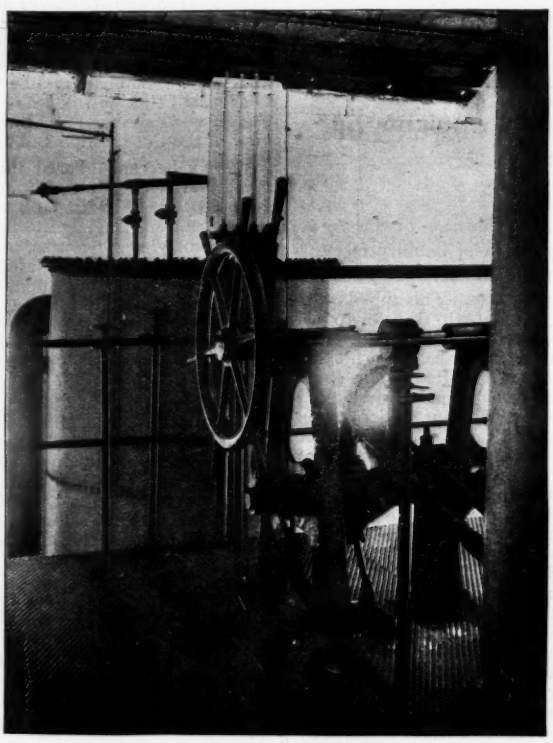
It may be remembered that in the autumn of last year the Chairman of the Metropolitan Gas Company of Melbourne (Mr John Grice) was in England in connection with the appointment of an Assistant-Engineer to the Company. During his stay in the Old Country, he, of course, took the opportunity of making himself acquainted with the latest methods of gas supply; and the knowledge obtained will doubtless prove of immense value to the Company, especially when applied in conjunction with the fresh ideas which Mr. P. C. Holmes Hunt, who is now on his way to Melbourne to take up the position above alluded to, will introduce. We are now to have a visit from another colonial—the Chairman of the Australian Gaslight Company (Mr. G. J. COHEN), who left Sydney on the 18th ult., in the *India*, for England. Two days before his departure, he received from his colleagues on the Board and from the principal officials a hearty send-off. A numerous company made an excursion to Mortlake, where the Company's works are situated. The Deputy-Chairman (Mr. S. Dickinson) proposed the health of their guest, whom he described as a business man of scrupulous honour, whose integrity and ability were conspicuous by the first position he occupied on the boards of many of the leading undertakings. He called upon the company to wish Mr. Cohen a prosperous voyage and a safe return, refreshed and invigorated to take up his work again for many years to come. The toast having been warmly honoured, Mr. Cohen responded, expressing the pleasure it had given him to be associated for so long with the gentlemen surrounding him in the management of an institution which had grown, he thought, to be about the largest employer of labour in Sydney.

Much to the regret of all associated with the firm of Messrs. Humphreys and Glasgow (which regret will be shared by many engineers and other friends in the gas industry), Mr. J. ARNOLD NORCROSS has relinquished his position in connection with the firm, and last Wednesday sailed for America. The change was almost unpremeditated, and is entirely due to family considerations. During his stay in this country, the geniality of Mr. Norcross, the studious interest he took in his work, and the wide knowledge he possessed on all matters touching carburetted water-gas manufacture, which knowledge he never obtruded out of season, attracted to him a large friendship. From that friendship, we know that he has found it difficult to sever himself; but duty called him home. It may not be generally known that Mr. Norcross graduated at Stevens Institute in 1891; and he then went to the Consolidated Gas Company of New York, and served under Mr. W. H. Bradley, the Chief Engineer. After spending some time with that Company, he was entrusted with the superintendence for the Government of the erection of coal-gas works at the West Point Military Academy. As soon as these works were completed, he came to England to take service with Messrs. Humphreys and Glasgow. That was in January, 1894. For the first few years, he was engaged in the construction department; but for the past five years, he has been chief assistant to Mr. Glasgow in the London office—in fact, he has been his "right-hand man." On re-settling in America, he will take up the position of Engineer and Manager of the New Haven (Conn.) Gas Company's works, the President of which is his uncle, Mr. Charles H. Nettleton. In his new field of work, Mr. Norcross's English friends will wish him a full measure of success.

A COMBINATION DELLWIK WATER-GAS AND PEEBLES OIL-GAS PLANT AT CLEETHORPES.

An Interesting Departure.

Since the advent of Mr. E. J. Brockway at Cleethorpes, he has dignified the gas-works by improvement almost beyond recognition. He is in the happy position of having an indulgent Board—indulgent because, in the exercise of their common-sense and business aptitude, they recognize that, while they have an energetic Engineer whose lines of advice produce them an increasing business and revenue, they can afford to allow him a reasonable amount of "loose rein." The works to-day, the results, and the progress made are evidence of the wisdom of their policy. We have long since come to the conclusion from many visits to works throughout the country—and directors may take the hint—that in those that are most complete, even down to helpful and comparatively inexpensive appliances of a minor character, there are the engineers found who take the greatest personal interest in their work. And it must be so; for completeness in detail in a plant is a great incentive to study. Our meaning is easily explained by a simple illustration drawn from Cleethorpes. In several parts of the works, Mr. Brockway has registers making diagrammatic records of the working of his various plants, by which, without keeping a close surveillance over the men, he has daily certificates of their and the plants' performances. In connection with his new water-gas and oil-gas plants, too, he has one of Messrs. Alexander Wright and Co.'s one-candle pentane photometers, which is specially adapted for the testing of water-gas. And all these aids to maintaining efficiency in even such a moderate sized works must also assist in giving an engineer an increasing interest in, and a more intelligent grasp of, his manufacturing operations. This was a feature that was noticeable on the occasion of a visit last week to Cleethorpes; and the absence of similar complete arrangements has been a feature of many works of larger output previously inspected.



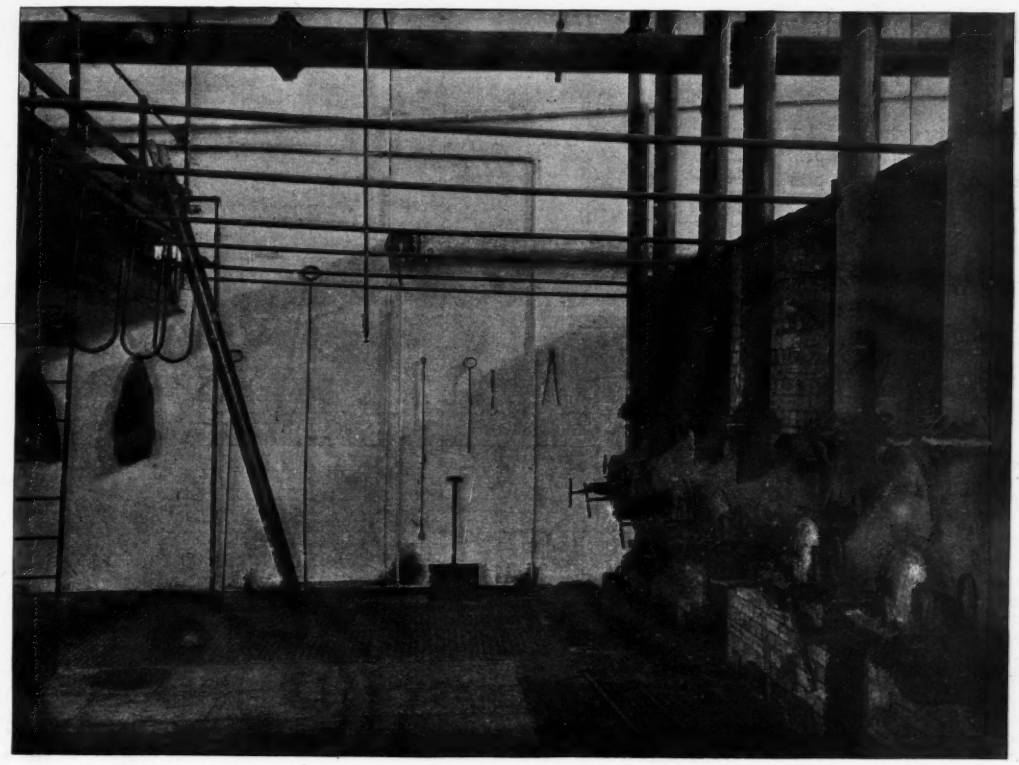
A View of Part of the Water-Gas Generating-Floor.

Among the extensions and improvements that have been made at Cleethorpes is an installation of the Dellwik-Fleischer water-gas apparatus, and, in combination with it, of a Peebles oil-gas plant. Herein we find Mr. Brockway has stepped from the beaten paths of water-gas manufacture in this country. The idea of making blue water gas with an admixture of oil gas was suggested by Mr. Thomas Glover in his address to the Midland Association in 1901; and the results of this consummation of that idea will be watched with peculiar interest throughout the gas profession. Mr. Brockway is satisfied, from what has already been achieved (and he and his Board are willing for the utmost information regarding the working to be given as it is obtained), that the departure is fully justified. Anyway credit is due to him for having had the courage of his convictions, and leading the way in the putting down of this combination type of plant in England. There is no doubt that the combination gives him the greatest possible range in manipulating the plant to meet the circumstances of the times in respect of both market values and gas demand. But, speaking generally, in all but one particular, the same range can be accomplished by the ordinary Lowe type of plant with a bye-pass arrangement; and so it is with such a plant that Cleethorpes will have to vie for supremacy. With increscent experience and the publication of the results, the proof of superiority of one or the other, or an equality between them, will be established.

An inquiry as to the necessity for the new plant produced some interesting notes which may well preface the description—showing as they do a somewhat remarkable development of the gas business at Cleethorpes. In January, 1900, the capital stood at £48,000; and during the three years to Dec. 31 last, some £18,000 was spent on manufacturing plant. To put it in another way, the capital spent on the works in the three years was 37 per cent. of the total at the end of that period. Now in 1889, the consumption of gas was 53 million cubic feet; while last year it was 80 million feet, or an increase of 66 per cent., and this year bids fair to show a further accession of 10 millions or thereabouts. A diagram before us showing these figures illustrates in a very striking way what this augmentation in output means. But the gas-producing portion of the new plant which is represented in the expenditure of the past triennial period is equal to at least 80 per cent. more than the present output (due principally to the water-gas plant). In short, with an increased capital of 37 per cent., the producing plant has been enlarged by above 100 per cent.; and so the Company are well prepared for a continuation of the notable development of the past three years. From the consumers' point of view, the results have also been satisfactory. The price in 1889 was 3s. per 1000 cubic feet; in 1900, 3s. and 3s. 2d.; in 1901, 2s. 11d. and 2s. 8d.; and a further reduction is just announced to 2s. 9d. and 2s. 6d. From the shareholders' point of view (in addition to the great enhancement in value of their assets), the profit has risen from £3934 in 1889 to £5231 in 1901. The reserve fund in the same years was increased from £2500 to £3000; and in 1901 an insurance fund was also established. The capital employed per 1000 cubic feet of gas sold was decreased from 19s. 7d. to 16s. 8d. Such prosperity is a matter for much gratification to all concerned.

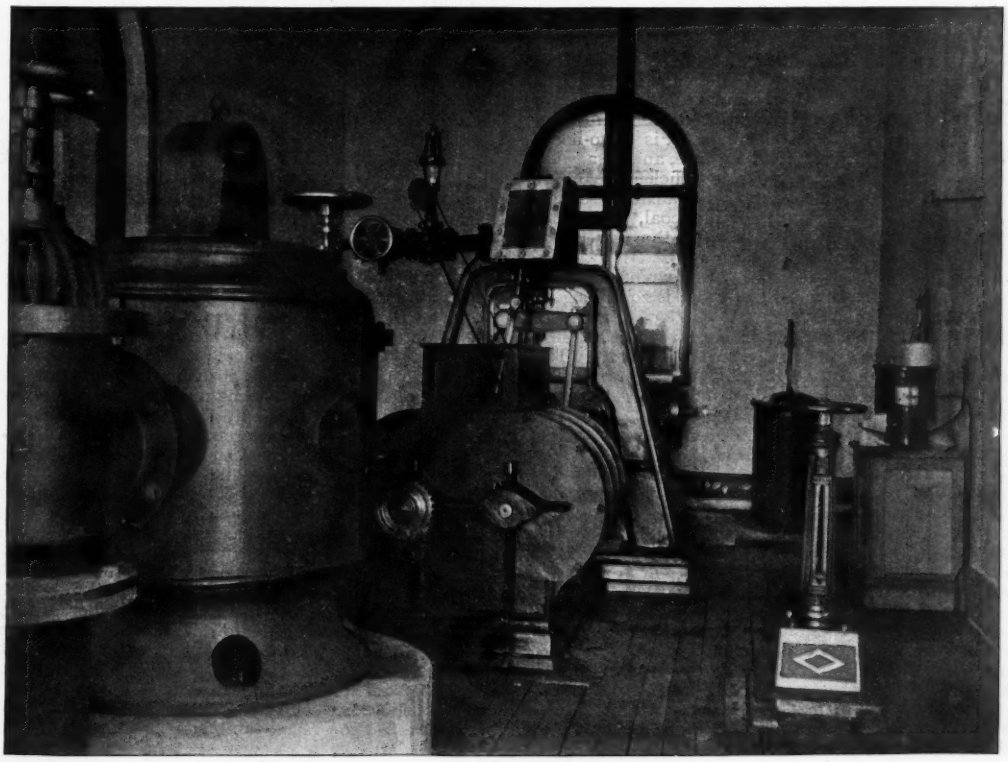
It is not intended in this article to deal with the extensions generally, although they are many, and important to the Company. It is rather desired, in view of the transcendent interest attaching to it, to confine ourselves to the latest of the additions—that is the combined water-gas and oil-gas plant. It should, however, be incidentally mentioned that in the three years the number of coal-gas retorts has been increased from 30 to 66. Notwithstanding this doubling of the retort power, the persistent rapidity of the increase in consumption, set, some twelve months ago, the Engineer face to face with a serious problem. It was then imperative that the productive power should be immediately increased; and the question was as to the best and most expeditious manner of doing this, with the least occupation of ground space. His election, under the circumstances, was in favour of water gas; and, after visiting several installations, he determined on the combination mentioned — a Dellwik-Fleischer blue water-gas plant and a Peebles oil-gas plant. The installation of the former was completed just in the nick of time; for in December last the Engineer was at the end of his producing resources, and the blue water-gas plant came as a welcome and effective support in meeting the heavy demand of Christmas week. Since then the plant has been in daily use. The second part of the combination—the Peebles oil-gas plant—was brought into service some six weeks ago.

With these prefatory remarks, we will give a general description of the plant; and then follow with an indication of the various methods by which its usefulness may be varied—giving, in conclusion, a statement as to the working results to within a few days since. By adopting this line, gas engineers will be able to judge for themselves as to the degree of success Mr. Brockway has achieved, and the promise of its continuation and enhancement. The plant was designed for a minimum production of 250,000 cubic feet of carburetted water gas of 18-candle power per twenty-four hours, but it has been found to be capable of yielding 300,000 cubic feet. The Dellwik-Fleischer plant is contained in a house 30 ft. by 16 ft. by 22 ft. high to the eaves, with a working stage 14 ft. 3 in. from the ground line. The building is substantially constructed. The walls are 14 inches thick; and the foundations have been carried to a considerable depth, owing to the unsatisfactory nature of the subsoil. The producing plant consists of a generator, superheater, and scrubber; but as they are of the Dellwik-Fleischer standard type, no special description of them is necessary. The plant really requires little attention outside the actual work of gas production. Before starting in the morning, the man in charge clinkers out; and this is found to be sufficient for quite twelve hours' working. The



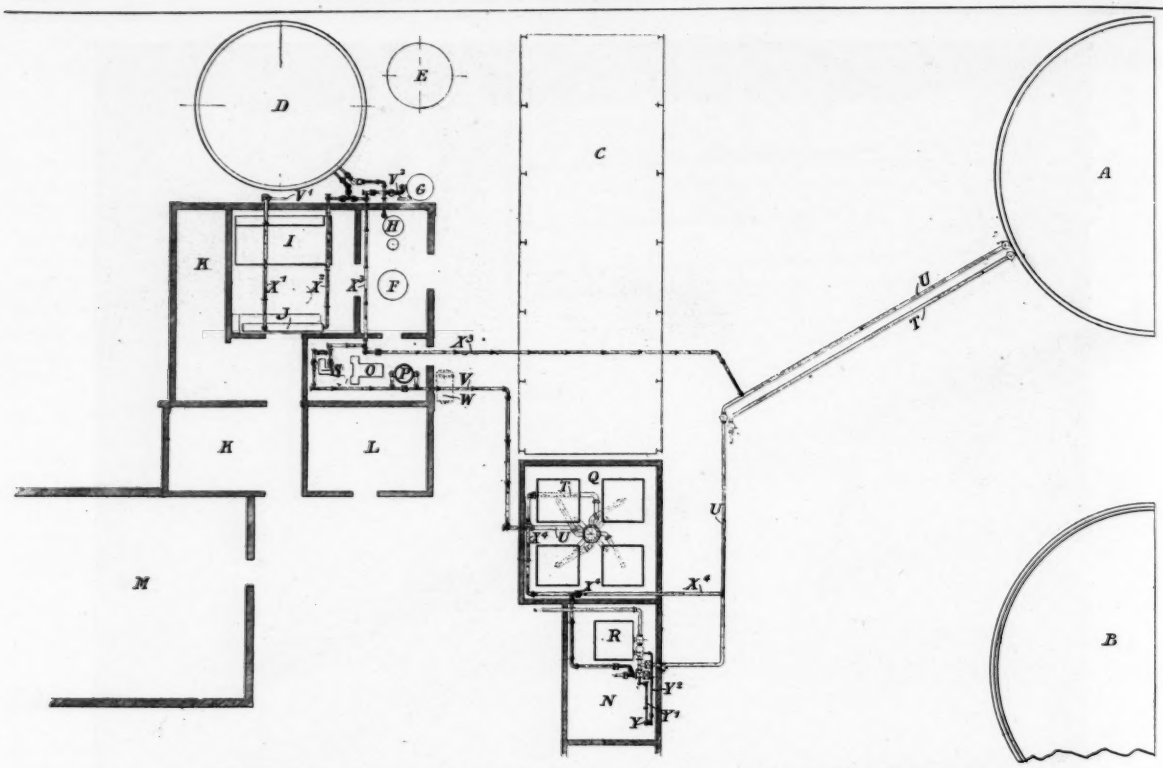
THE PEEBLES OIL-GAS PLANT.

runs are of 13 to 14 minutes' duration, with about a 2 minutes' blow. The plant is worked at a stretch (though not constantly) ten hours a day; and the production in that time is approximately 130,000 cubic feet. The coke for feeding the plant is elevated to the working-stage by a hydraulic hoist, on the platform of which is a hopper of a capacity sufficient for the supply of coke for six hours' continuous work. The hopper is elevated to a height above the working-stage, to allow the coke to fall through a shoot into the charging-waggon of the generator. The hopper is fed by barrow from the ground level of the Peebles oil-gas plant house, which adjoins the water-gas plant house. The oil-gas house is 30 ft. by 30 ft. by 22 ft. high. It contains three arches of two retorts; each retort being 24 inches diameter by 9 ft. long. Again, the published information concerning this system of making oil gas renders unnecessary any particular description. But one or two points may be mentioned. The retorts are of cast iron; and



THE ROTARY METER, ROOTS' BLOWER AND VERTICAL ENGINE, EXHAUSTER, AND GOVERNOR ROOM.

(In the picture, the Rotary Meter appears larger in proportion to the other plant than it really is. This is due to inability, in taking a photograph in such a confined space, to get the whole of the plant into focus.)



PLAN OF CONNECTIONS RELATING TO THE CARBURETTED WATER GAS PLANT.

A.—No. 1 Holder for Storage of Carburetted Water Gas. B.—No. 2 Holder. C.—New Coal-Gas Purifiers. D.—Blue Water Gas Holder. E.—Oil Tank. F.—Water-Gas Generator. G.—Oil Scrubber. H.—Water Gas Scrubber. I.—Oil Gas Retort-Bench. J.—Oil-Main. K.—Boiler-House. L.—Coal Gas Engine-House. M.—Retort-House. N.—Station Meter and Governor House. O.—Blower. P.—Rotary Meter. Q.—Water-Gas Purifiers. R.—Station Meter. S.—Exhauster. T.—Outlets, 10 inches diameter. U.—Inlets, 10 inches diameter. V.—8-inch Main to Purifiers V1.—To Condenser Main. V2.—Condensers. W.—Overhead Oil-Supply Tank. X1.—8-inch Carburetted Gas-Main. X2.—8-inch Blue Water-Gas Main. X3.—8-inch Coal-Gas Main from No. 1 Holder. X4.—8-inch Main for Carburetted Water Gas to No. 1 Holder. Y.—Injector. Y1.—To Injector. Y2.—3-inch Main for Benzol.

the three arches are heated by one generator furnace, and is so arranged that any one arch can be shut off if desired. Cleaning out is only required once a day. The whole bench is equal to the production of about 3600 cubic feet of 90-candle gas per hour, or each pair of retorts to about 1200 cubic feet. Only one pair of retorts is at present in use. The admixture of oil gas and blue water gas is proportioned so as to give a gas of between 17 and 18 candle power. The quantity of oil used from the start has equalled 2¼ gallons per 1000 cubic feet of the carburetted water gas. The best results are obtained when the oil gas is of a pure lemon tint, and the heats are of a dull red.

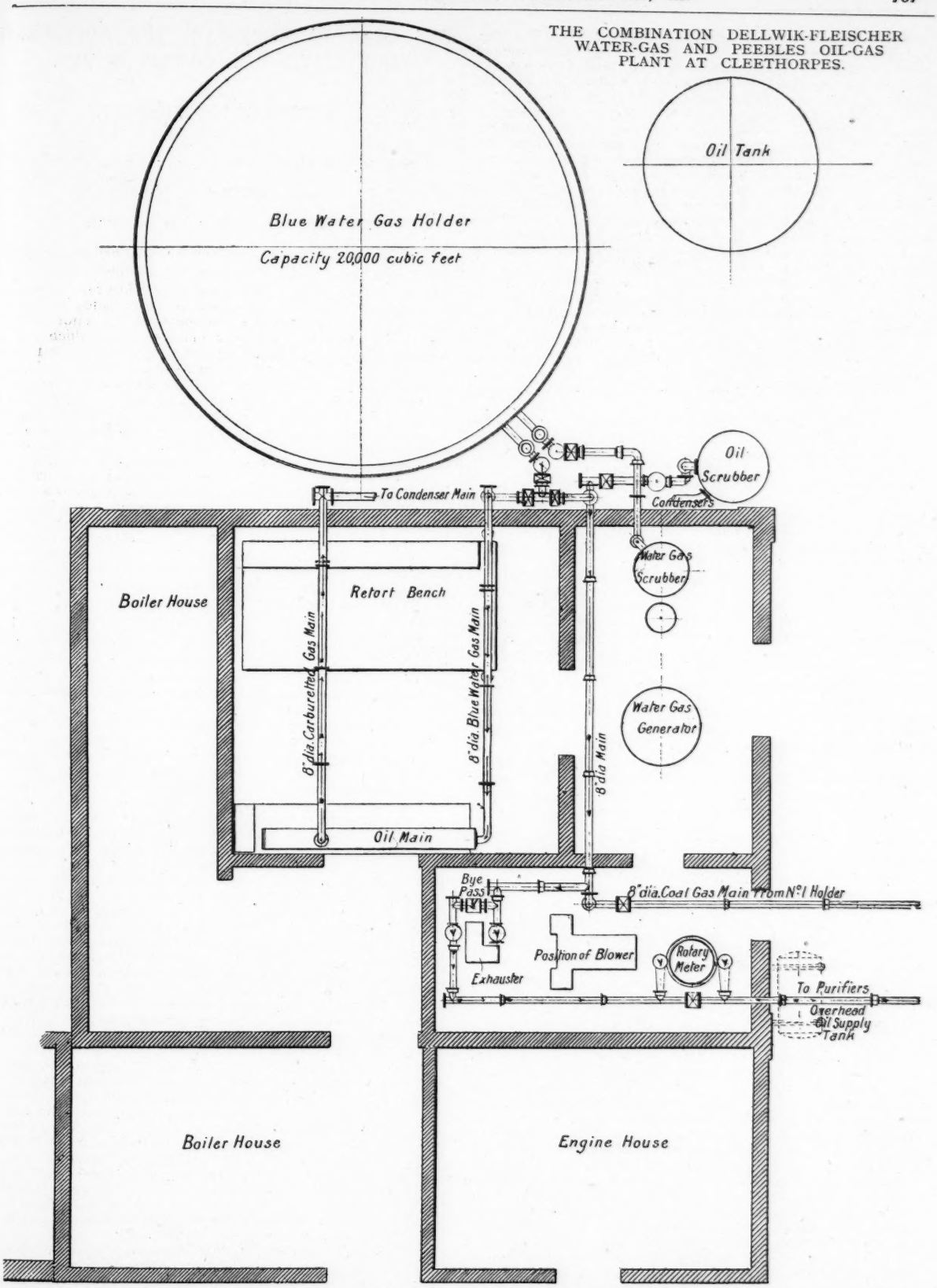
At the end of the oil-gas house, a Lancashire boiler, 7 ft. 6 in. in diameter by 28 ft. long, has been installed. It is of 40-horse power, is fitted with a Meldrum patent furnace, and is a good example of work. It will not only generate sufficient steam for the water-gas plant, but will also act as an auxiliary to the existing steam plant, for the supply of the coal, coke, and oxide handling plants, &c. The space between the new buildings and the old exhauster-house has been utilized for a machinery room; so that generally speaking, the extensions form a very compact block of buildings. The room is 29 ft. long by 15 ft. wide; and in a short time from now it will look very spick-and-span—the next work to be taken in hand being the tiling of the floor and the setting up of a glazed tiled dado. The room contains much of interest to the engineer. There is, in a central position, a Roots' blower and engine for supplying the air to the blue water-gas generator. The blower is a positive-action one, and is coupled direct to a Thwaites ordinary vertical engine of about 20-horse power. The blower and the engine were working with beautiful regularity and smoothness during the blows that were witnessed at the time of the visit. We are reminded by the next piece of plant that so far it has not been mentioned that the Contractors for the complete installation were Messrs. R. & J. Dempster and Co., Ltd., of Manchester. In the same room is fixed one of their rotary exhausters and engines for drawing away the blue water gas or the carburetted gas, and forcing it through the purifiers into the storage holders. The exhauster is capable of passing about 15,000 cubic feet per hour. Adjacent to the exhauster is an ordinary gas-governor, connected with a bye-pass, for the purpose of dealing with any excess variation of the gas coming forward. Perhaps the greatest object of interest in the machinery-room is an example of the Thorp and Marsh rotary meter. This is the first time that we have seen this simple and modest-looking method of registering large quantities of gas applied to a water-gas plant; but we believe that one has been installed for a somewhat similar purpose at Tipton. Although the one at Cleethorpes is capable of passing 30,000 cubic feet of gas per hour, it only occupies (including the valves and connections) a space of 7 ft. 6 in., by 6 ft. 6 in., by 5 ft. 6 in. high; and this must be a great consideration. It speaks of the satisfaction of Mr. Brockway with the operation of the meter to learn that he has ordered another of 5000 cubic feet capacity.

The erection of a new set of purifiers for dealing with the coal gas has released the small set that Mr. Brockway had previously in use for his coal gas; and these he has now brought into service in connection with his carburetted water-gas plant. Among the other plant included in the new installation is the relief holder, which is on the spiral-guided principle, is 40 ft. diameter by 16 ft. deep, and works in a steel tank. It has a capacity of 20,000 cubic feet, and is a strong piece of construction. Hard by, too, is seen the oil-store tank, 16 ft. diameter by 14 ft. deep, with a capacity of 18,000 gallons. Turning back into the oil-gas house, a small overhead oil-tank is seen, into which the oil is pumped from the store-tank. The overhead tank holds sufficient for twenty-four hours' continuous working, and is supplied with a registering indicator and float. The quantity of oil passing from the store-tank to the overhead tank is registered by an oil-meter, so that a careful check on the amount of oil being used is always at hand.

This mention of the measurement of the oil reminds us of the several automatic checks that Mr. Brockway has in and about this plant. In the machinery room was seen one of Thorp and Marsh's ingenious little instruments, known as their water-gas cycle recorder, which keeps an accurate register of what is taking place in connection with the blows and runs. By its aid, there is little personal interference with the men. The recorder keeps watch, and what is seen on the diagram is sufficient to satisfy the engineer or warn him of any negligence in duty. In the boiler-house, there is also one of Bailey and Sons' boiler-pressure registers. There is also the Thorp and Marsh rotary meter; and in a little photometer room Alex. Wright and Co.'s one-candle pentane photometer. The photometer is supplied direct from the water-gas purifiers; and the work is regulated by its indications. The candle power is constantly and carefully tested during its progress to the storage holder, and again when it is being delivered into the town. If by its means the foreman finds during manufacture the quality of the carburetted water gas going up above the desired point, he adds a little more blue water gas; but if it is diminishing in quality, then he increases the proportion of the oil gas. There is also a jet photometer in the room; and in the oil-gas house again, thermometers are to be inserted in the inlet and outlet of the hydraulic main for temperature tests. Therefore, it is evident that Mr. Brockway is able to keep a very careful record of the results obtained with the apparatus.

There is yet one more part of the auxiliary plant to be noticed, and that is the Maxim benzol carburetting apparatus. This

THE COMBINATION DELLWIK-FLEISCHER WATER-GAS AND PEEBLES OIL-GAS PLANT AT CLEETHORPES.



stands in one corner of the old station meter and governor room; and the gas can be benzolized as it goes into the holders or into the town. At the present time, the plant is not in use; but it is intended to bring it into action again when in the summer the make of blue water gas is reduced to 60,000 or 70,000 cubic feet per day, and the Peebles oil-gas plant is let down. The benzolizing plant is quite capable of dealing with 60,000 or 70,000 cubic feet of gas per hour. Here again it is noticed that a careful record is kept of the quantity of benzol used; a separate carburettor being employed for the water gas, so that the results will not be confused with those realized by the coal-gas benzolizing plant.

This description must already have shown the reader that the new plant is designed to give the widest possible range of utility. Mr. Brockway has already employed it in a variety of ways; and it is quite evident that he intends to take full advantage of any special points in its construction which will enable him to reduce, according to the prevailing circumstances at any time, the cost of producing gas. In fact, he expresses his confidence that, when working the whole plant, he will be able to do this to the extent of 4d. per 1000 cubic feet less than the present cost of the coal gas in the holders.

Now let us proceed to examine briefly into the methods he has adopted in utilizing the new plant. The blue water gas is made in the Dellwik generator, and passes through the scrubber into the relief holder. If the oil-gas plant is not being used, a

constant stream of blue water gas is taken from the relief holder, and, before passing through the exhauster, is met by a volume of coal gas, and the mixed gases then pass forward through the purifiers, and meeting a further quantity of coal gas mixed with benzol vapour is carburetted to the desired candle power.

In addition to this method of carburetting, Mr. Brockway has also taken a 2-inch wrought-iron main from his blue water-gas holder, and connected it to the inlet of his coal-gas foul main, in order to obtain any possible advantage by the water gas picking up the hydrocarbons not thoroughly fixed in the coal gas. So far, he has been able to mix blue water gas with his coal gas in this manner to the extent of 15 per cent. of his total make with a very slight deterioration in the illuminating power, which, in fact, he states, does not exceed ¾ candle. The illuminating power of the coal gas made is from 17½ to 18 candles; the coal used being Strafford or other high-class South Yorkshire coals.

In the event of oil-carburetted gas being required (and this is the system now being worked), the Peebles oil-gas plant is brought into action; the blue water gas uniting with the oil gas in the hydraulic main in the oil-gas house. The carburetted water gas is then condensed and washed; and any hydrocarbons not thoroughly fixed are returned to the oil-gas retorts. This appears to be an advantage of this process that there is no inconvenience from waste oils; these being returned to the retorts and again used.

Arrangements are also being made to pass heated blue water gas into the oil-gas retorts; for present indications seem to show that, if this is done, the coke which has previously been obtained as a residue of the oil in the retorts will be materially reduced; it having been demonstrated that the water gas meeting the oil gas in the hydraulic main has already reduced the amount of coke deposited. The idea is to heat the blue water gas by running a pipe through the waste-heat flue of the oil-gas retort-setting; and by working in this way, it is anticipated that the best possible results will be obtained.

One other point to make the list of the varied uses of the plant complete. In the event of Mr. Brockway desiring an enriching agent only for his coal-gas, the oil-gas plant has been arranged so that it can be employed altogether independent of the water-gas apparatus. In fact, the object of both the Engineer and Messrs. R. & J. Dempster has been to produce a plant capable of serving as many uses as possible.

Now as to the results. Mr. Brockway has kindly acceded to our request to give us, from his carefully kept records, the separate and total costs of his working of the combined blue water-gas and oil-gas plants during the 32 days they had been running together preceding the visit. It will be remembered that all the coke is weighed and the oil measured; and the figures include actual wages and an allowance for foreman's supervision :—

Cost of Production of 2,600,000 *Cubic Feet of* 18-*Candle Gas.*

Oil—5694 gallons at 2¾d.	£62	5	7
Coke for water-gas generator—37 tons 14 cwt. at 10s. per ton	18	17	0
Coke (fuel for oil-retorts)—15 tons 12 cwt. at 10s. per ton*	7	16	0
Wages—5s. per 100,000 cubic feet	6	10	0
Purification—0·125d. per 1000 cubic feet	1	7	1
	£96	15	8
Less coke residuum—5 tons 12 cwt. at 10s. per ton	2	16	0
	£93	19	8

Equal to 8·67d. per 1000 cubic feet.

At the time of the visit, a photometrical test that was made of the gas as it was being sent out showed an illuminating power of 17¾ candles. At the present time, the amount of carburetted water-gas distributed is equal to 25 to 30 per cent. of the total bulk of gas. In other words, the coal gas represents roughly 200,000 cubic feet of the total of 300,000 cubic feet sold. Mr. Brockway is just now testing a series of flat-flame burners to see which type is best suited for this gas; and so far he has found that a No. 7 tip on a 5-feet governor yields the best results. As soon as a burner is settled upon that gives the best return from the mixed gases, it is intended to distribute it among the consumers free,

This exhausts the information we have at present to supply on this (for England) unique carburetted water-gas combination; but, before closing, a word of congratulation must be passed to Mr. Brockway for the interesting position and high pitch of equipment to which he has brought his works, and to Messrs. R. & J. Dempster for the satisfactory and substantial manner in which they have completed their part of the latest new work. The whole of the brickwork and foundations were executed to the Engineer's designs and under his superintendence by local firms, and they, too, deserve praise. The time spent by us at Cleethorpes was indeed full of interest.

* It should be pointed out in regard to this item that, in view of the fact that the plant is only used (and not constantly) ten hours a day, and the oil-gas furnace designed for heating six retorts, the stand-by charges are, of course, unduly high. As the time and amount of production of oil gas is increased, so the average cost of fuel per 1000 cubic feet of gas will be reduced. The same remarks, in a measure, apply to the water-gas generator, which has been working only on an average (over the 32 days) of five or six hours a day.—Ed. J.G.L.

THE GRANTON WORKS OF THE EDINBURGH AND LEITH GAS COMMISSIONERS.

DESCRIPTION PREPARED

BY

WALTER RALPH HERRING, M.INST.C.E., *Engineer.* *

ARTICLE XI.

RETORT MOUTHPIECES AND FITTINGS.

Plate No. 12, figs. 9 to 15, exhibits the enlarged details of the retort mouthpieces and the pipes immediately in connection therewith. Plate No. 13, figs. 1 and 2, will illustrate the general arrangement of the ascension pipes—see also Photograph No. 57. The change of angle between the section of the retort at right angles to the base and the retort mouthpiece lip, which is at an angle of 58° with the base of the mouthpiece, alters the form of the section of the retort. To better illustrate this point, the cross-section of a circular pipe at right angles to its base or length is a complete circle; but if it is cut at an angle of 58°, the cross-section is of oval form. This is a point of considerable importance, and one that materially affects the easy discharge of the coke through the mouthpiece. Instances are not unknown of the cross-sections of the mouthpieces of both horizontal and inclined retorts being distinctly different from the cross-section of the retort. When the form of the mouthpiece is in any way constricted in relation to the form of the retort, a choking effect must of necessity result when drawing the coke. Care should, therefore, always be taken that the mouthpiece section is of such a form as to prevent this. In fact, it is better to exaggerate the section of the mouthpiece so as to permit of a larger area, rather than a reduced area, for the discharging material.

The section of the "Edinburgh" retorts, as already stated, is in the form of a ⊓ with outwardly sloping sides; so that the charge in the retort, when expanding during the process of coking, rises into a larger area instead of being constricted beneath the crown of the curved portion of the retort. To retain this section throughout to the lip of the mouthpiece, makes the form of the mouthpiece opening different from the cross-section of the retort. The outwardly sloping sides of the ⊓ retorts of the "Edinburgh" section are carried up a distance of 6 inches from the inside base of the retort before the curved portion of the crown begins to gather over. To preserve this section throughout the mouthpiece, necessitates the sides of the casting rising a distance of 7½ inches at the mouthpiece lip. The greatest care should, therefore, be taken to preserve the full section of the retort throughout. The upper or charging end mouthpiece is not of so material importance—see Photograph No. 58. Its shape can be varied, and its size reduced. I do, however, strongly advocate that the base or width of the mouthpiece should be the same as the base of the retort; but the depth of the mouthpiece opening can be reduced. The projection from the face can also be reduced to what is just sufficient to enable the lugs for the hinges and catch to be properly arranged for—a distance of 4½ inches from the flange to the lip being ample for this purpose. The mouthpiece fastenings at Granton are of the ordinary Holman type. A mouthpiece with self-fixing and releasing catch is, however, preferable, as in this instance one motion, or one hand, is sufficient to perform the operation of opening or closing the doors, whereas with a hinged catch two hands (not men) are required for this operation.

Inside the curved portion of the cast-iron mouthpiece doors (Plate No. 12, figs. 9 and 10), a 3-16-inch plate is secured to the cast-iron cover by means of four bolts, with a distance-piece on each. The cavity thereby formed is nearly 2 inches deep at the centre, diminishing to nothing at the outside edges. It is filled with non-conducting composition to prevent radiation of heat, and to protect the men.

The frequent trouble arising from the burning through of the bolts securing the mouthpieces to the retorts, induced me to fix as many bolts as possible—particularly on the lower ends. Eight bolts are provided on the charging end, and nine on the drawing end. Care must, however, be taken to keep the bolts clear of the front cross-stays. It is not, however, wise to depend upon bolts at all where other means can be adopted.

The necessity for securely cross-bracing the lower fronts of an inclined retort-bench cannot be too keenly emphasized. The whole mass of the work in the setting is practically lying at the angle of repose of the material employed—a brick placed at the upper end of an inclined retort, and gently pushed, will slide completely through—bearing in mind the fact that the whole mass of work is a number of innumerable pieces bedded together with material that has no setting or adhesive properties, and that the mass is ready to move forward with the slightest disturbance or inducement. Therefore, the strongest form of bracing that can be introduced is necessary—particularly in the first instance; for after the setting has been once brought to its full heat and maintained so for a little while, it will have become fluxed together and rendered, as it were, one composite whole. Thereafter, it is

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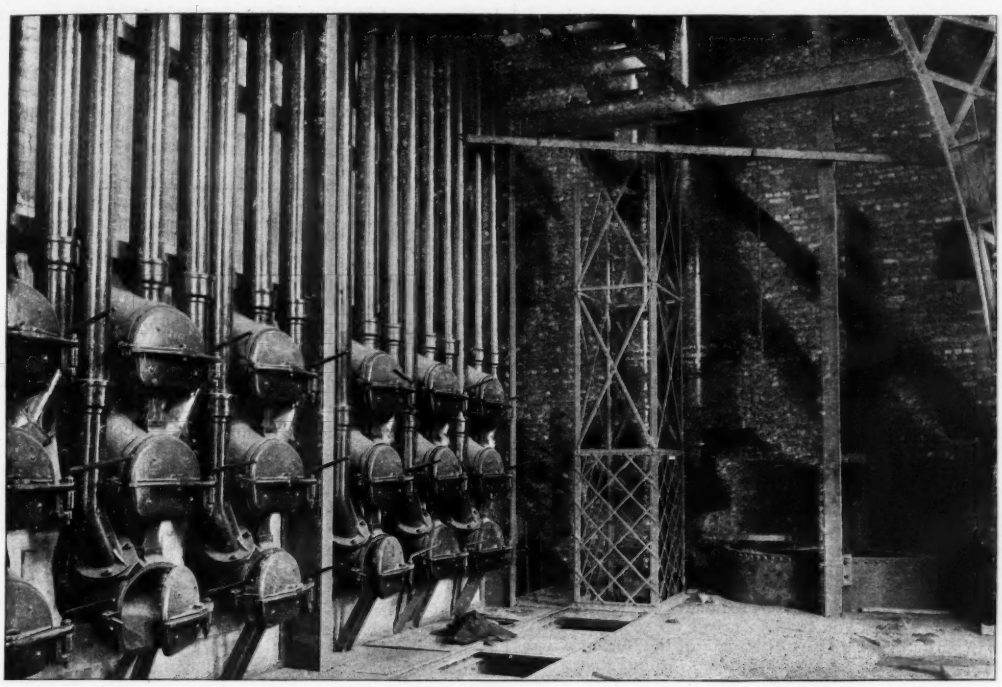
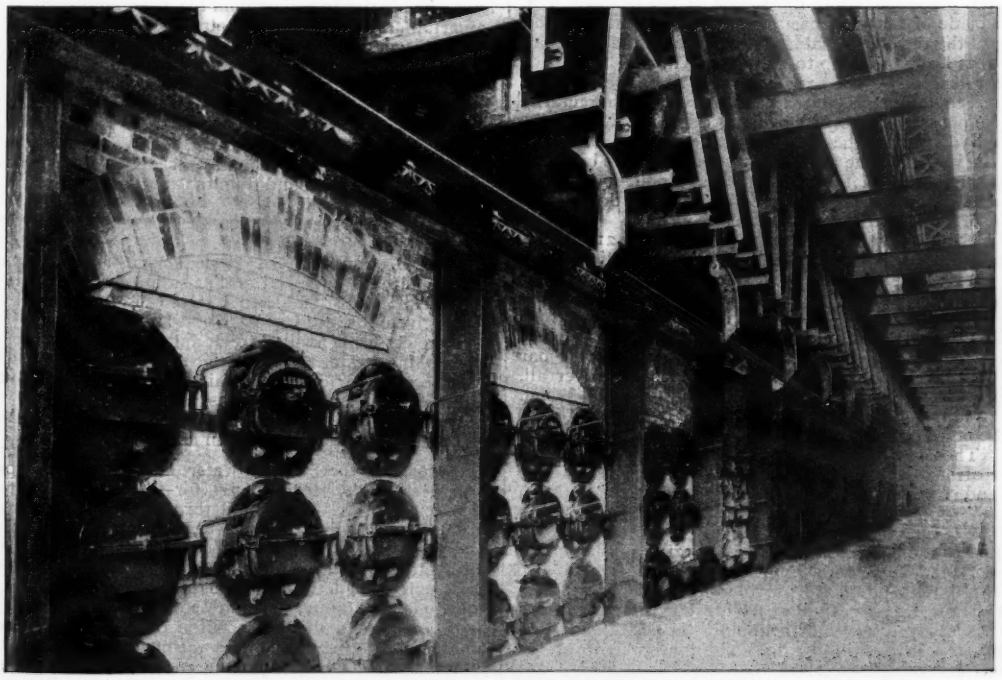


PHOTOGRAPH No. 57.—General arrangement of the ascension pipes, bends, and mouthpiece supports on the drawing stage.

only upon lighting-up and letting-down, or with changes of temperature during work, that this tendency to move forward really exists. Unfortunately, without an undue extension of the length of the front mouthpiece, it is not easy to get a very substantial section of cross-stay, owing to the ascension pipe bends and the heavy cast-iron lugs supporting the mouthpiece doors leaving but little room for this purpose—see Plate No. 12, fig. 9. In fact, to be sure of everything clearing, it is very important that these details should be drawn out to full size.

In the Granton installation, not only was this precaution taken, but one complete set of mouthpieces and pipes, cross-bracing and buckstays was erected at the Contractor's works to the exact positions and centres; and thereafter this one set was used as templates for the remaining 55 settings. Personally, I am not satisfied with the cross-bracing that we have introduced at Granton—not that it has failed; but I prefer a greater margin of safety, and in future shall still further extend the mouthpieces so as to permit of stronger cross-stays being employed. The extended length of the front mouthpieces suggested to me the wisdom of supporting the fronts by means of stools and brackets and transmitting the weight to the base—see Plate No. 12, figs. 9 and 12—so as to assist the front stays as much as possible. This system was, I believe, first introduced by Messrs. Cutler for horizontal retorts; and, in my opinion, it is worthy of consideration. The mouthpieces have seatings cast on them for receiving a cast-iron stool, which is purposely made less in depth than the distance between the seatings, so as to permit of flat steel wedges being driven in after the mouthpieces have been fixed to the retorts, thus allowing for the unavoidable inequalities in their setting. The bottom mouthpiece seating is supported by a bracket resting upon an angle-steel level with the floor; the centre one being formed in a slightly different manner (see fig. 14), so as to permit of easy access to the damper regulating the flow of gas to the lower half of the settings.



PHOTOGRAPH No. 58.—General arrangement of the retort mouthpieces on the charging stage.

The transverse cross-stays at the fronts of the mouthpieces consist of 5 inch by 4⅜ inch by 20 lbs. H steels, four in number, placed in such positions as to hold up the cast-iron flanges of the mouthpieces, which are set in flush with the face of the setting, and broadened to afford a bearing top and bottom clear of the bolt holes and angular seating cast thereon. The method of fixing the ends of these to the buckstays is a detail of some importance, in order to avoid the disturbance to neighbouring settings when one set is required to be removed for the resetting of the retorts. The details of the attachment for these cross-stays are shown in Plate No. 12, figs. 13 and 14.

In the first place, a long bolt, 1 inch in diameter, is passed through a hole in the web of the buckstay with a nut screwed tight up to the web with the bolt projecting on either side. The end of the cross-stay is splayed (fig. 14) by sawing a piece of the table off, so that the remainder of it passes within the flanges of the buckstay and abuts almost upon the web of it. The distance between the back of the 5-inch cross-stay and the inside of the flange of the 15 inch by 6 inch buckstay is made up by means of a cast-iron bracket, of special form (fig. 13), having a lip projecting on the under side. The purpose of this lip is to give a base for the support of the ends of the cross-stays. The back of the bracket is formed to fit within the flange of the buckstay; and the slight clearance left between the back of the cross-stay and the front of the cast-iron bracket is afterwards closed by means of flat steel plates and wedges. The brackets are threaded upon the long bolt passing through the web of the buckstay, and an additional nut is screwed on to secure the bracket in position. The bracket, therefore, not only supports the weight of the ends of the cross-stays, but it also transmits the thrust resulting from the expansion of the bench to the inside of the flanges of the buckstay, rendering the whole secure and tight. It will be seen from this arrangement that the brackets on either side of the buckstay can be taken down, and the cross-stays removed, without disturbing the fellow brackets on the opposite side. These cross-stays must be loosely placed in position as each row of mouthpieces is put on. The ends can be afterwards secured independently of the mouthpieces.

Incidentally, reference has been made to the experimental settings erected at New Street of which the Granton installation is but a multiple. These were securely braced at both the lower and upper ends. After three seasons' working, and upon investigating the condition of the settings, I found they were in a good state of repair, excepting that some of the middle joints of the retorts had risen and were somewhat uneven and projecting. Having previously had some experience with middle joints sinking, this was quite a new phase of the question; and after a careful examination of the settings, and some reflection, I could come to no other conclusion than that the efficient bracing of the top and bottom had held the retorts so rigid as to prevent their freely moving lengthwise, owing to the expansion through use. I, therefore, determined to abandon the cross-stays on the upper (or charging) ends of the installation at Granton, leaving them perfectly free to move lengthwise; and while it is perhaps too early to be perfectly assured of the correctness of doing this, six months' working shows no perceptible faults.

The mouthpiece stop which is shown in position in the retort in Plate No. 12, figs. 9, 10, and 12, consists of a blade 21½ inches long by a depth proportionate to the weight of the charge. The depth of the blade of the stop has an important influence upon the charging of the retort. Whatever the depth of the stop may be, the coal first levels itself up to the top of it, and then proceeds to layer itself along the base of the retort. The depth of the blade must, therefore, be made to suit the varied characteristics of the coal used, so as to just give the depth at the mouthpiece that will distribute the weight of the charge uniformly throughout the length of the retort. It should always be made to fit reasonably freely in the mouthpiece; but it should not allow sufficient clearance to permit of small coal descending beyond it to stew within the iron mouthpiece.

The "Edinburgh" stop consists of a ¼ inch plate, 21½ inches wide by 8 inches deep, shaped to fit the lower half section of the retort—the plate being perforated with holes ½ inch in diameter and 3½-inch centres. This, to a very great extent, prevents the warping of this portion of the stop. The tail of the stop consists of a 1½ inch by ⅜ inch flat bar, bent at one end and riveted to the plate by means of two ⅝-inch rivets, 3½ inches pitch; the bar descending at an angle of 75°. It is 29½ inches long over all. The outer end is flattened, and forged 2 inches wide by ⅜ inch thick, cut perfectly square at the end so as to rest in the recess formed in the bottom of the mouthpiece for securing the stopper in position. The outer wings of the stop plate are stayed to the tail by means of four struts consisting of ⅝-inch square iron flattened at the ends and riveted to the bar and the plate by means of ½-inch rivets. On the upper part of the tail, at a point 24 inches from the free end, a 2¼ inch by 2¼ inch by ⅜ inch angle cleat, 6 inches long, is riveted to the 1½-inch bar forming the tail, and also to the ends of two of the ⅝-inch struts by means of ½-inch rivets. Two 1-inch holes, 3¼ inches pitch, are provided in the upper flange of this angle cleat for the purpose of receiving the forked end of a bar which is employed in removing, holding in position, and re-inserting the stop in position again. The total weight of the mouthpiece stop complete is 31 lbs.

It is important that provision should be made in the base of the mouthpiece casting for upholding the end of the mouthpiece stop. In the earlier installations, a square-headed bolt was considered satisfactory for this purpose; but the projecting bolt-head offered very considerable resistance to the flow of coke from the retort—the whole mass sliding forward when the stopper was removed, but being brought to a state of repose as soon as it came in contact with the square head of the bolt. A pocket was, therefore, introduced for this purpose, and found to answer exceedingly well—offering no resistance to the outflowing charge.

THE EXTRACTION OF RARE EARTHS FROM MONAZITE.

THE following is an abstract translation of a contribution by Dr. G. P. Drossbach to the *Berichte* of the German Chemical Society, on methods for the isolation of some of the rare earth-metals from monazite sand.

On separating yttrium from erbium according to the Welsbach process, the author observed that considerable quantities of colourless earths, chiefly yttria, could be removed from the basic nitrates rich in erbium, by boiling with a solution of ammonium chloride. The following is the process: 40 grammes of the mixture of oxides were dissolved in a just sufficient quantity of hydrochloric acid; and the same oxide mixture was added until the supernatant solution no longer showed the erbium bands. After being evaporated to the consistency of syrup, a quantity of boiling water was poured over it. After frequent decanting, there was obtained a yttrium solution containing but little erbium, while an oxychloride rich in erbium remained. The solution was evaporated and decomposed with ammonia. In this manner, three fractions were obtained—the oxychloride rich in erbium, a larger quantity of the middle fraction, and a perfectly colourless yttrium fraction. The separate fractions were converted into oxalates, and these, by heating, into oxides. In the last fraction, there was 94 per cent. of yttrium oxide.

Passing on to the separation of didymium, the author rejects the Welsbach method, on account of the many thousand fractions which are necessary, and prefers that described above, which he applies to didymium. By this means, fractions rich in praseodymium are obtained, which serve as a starting material for praseodymium. Neodymium is obtained by dissolving didymium carbonate in a saturated solution of potash, and mixing this solution with dilute potash solution. A precipitate is thereby thrown down; while the remaining solution shows the neodymium spectrum. For the further separation of the separate fractions, the crystallization of the magnesium double nitrates is utilized. In this manner, after seven fractionations, a material almost entirely free from praseodymium is obtained. The process is as follows: The double salt is dissolved on the water bath in water, until only a small quantity remains undissolved. The basin is cooled to 30° to 40° C., about one-tenth of the total quantity is allowed to crystallize out, the solution is poured off, cooled to 10° to 15° C., and again allowed to crystallize. This fractional crystallization is systematically carried out. If the first product which is rich in neodymium has been employed, neodymium, samarium, and other earth-metals become concentrated in the solutions, which give no definite crystallizations. The solutions are precipitated with sodium bisulphate in the cold, and the precipitate is washed with a solution of sodium sulphate. Erbium and yttrium are in the solution; but in the precipitate there are neodymium and samarium. The latter is converted into hydrate, and treated according to the oxychloride process mentioned for yttrium. Lastly, the author states that he has succeeded in separating cerium from didymium and lanthanum.

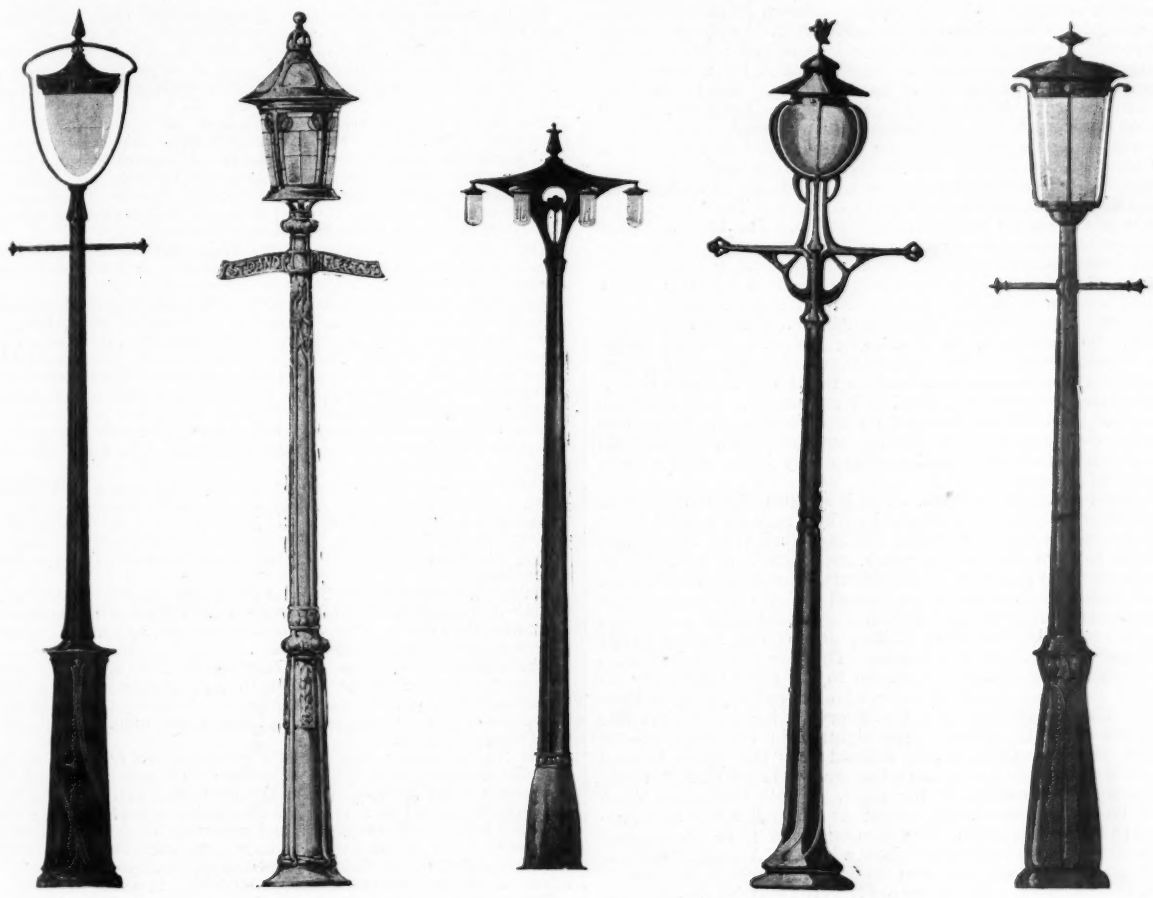
The Diagrams in Mr. Fowler's Paper: An Erratum.—A correspondent has called attention to an error in fig. 7 in the *addendum* to Mr. Fowler's paper at the Manchester District Institution given in the "JOURNAL" last week (p. 698). The smaller curve refers to Sackville Street, and the larger one to Whitworth Street, Manchester. Mr. Fowler regrets that the mistake should have been made; and he explains that it occurred in the process of tracing the curves from his rough sketches, and was not detected owing to the despatch of the finished drawings unchecked by him during his absence from home.

Measuring the Flow of Water in Pipes.—An apparatus has been designed by Herr Hentze for the measurement of the flow of water in pipes. A solenoid through which an alternating current is passed is fixed axially within the pipe, and is provided with a movable iron core, to which a disc is attached. The water pressure acting on this disc forces the core into the solenoid against the electro-magnetic repulsion of the current. The impressed voltage is maintained constant, so that for each rate of flow the core comes to a definite position of equilibrium. In order to obtain quantitative readings, a wattmeter or ammeter is provided, by means of which the choking effect on the current in the solenoid for different positions of the core may be observed and duly allowed for.

A STUDY OF STREET LAMPS.

THE desirability of keeping designs of street lamp-posts up to a modern standard of elegance and serviceability has often been insisted upon in the "JOURNAL;" and the force of the demand has been recognized by the most important highway authorities, metropolitan and provincial, as well as by the chief advisers of gas and electric light companies. It cannot, however, be said truly that the abstract ideas of what is fitting and acceptable in this particular application of Art to a useful object are always, or even frequently, realized in fact. The reason for this shortcoming—where it really is such, and the cause of offence is not a sheer disregard of every consideration other than the barest sufficiency and the utmost cheapness—is that adequate attention has not been given to the subject beforehand. To do them justice, it may be believed that the street authorities of most towns in this country are inspired with some regard for the amenities of their main thoroughfares, in which the public lamps are such prominent features; but there is very rarely enough system and forethought in their counsels. It consequently happens too often that when the call arises for a new equipment of the public lighting service—to confine ourselves to the matter in hand—there are no established principles to fall back upon as a guide to the selection of patterns, and no time to get fresh and appropriate designs. The result too often is that the whole job is carried out by contract, and that nobody is responsible for the choice of the design of the new lamp-posts which the town will have to put up with for the ensuing fifty years. Fearful and wonderful consequences have followed from this truly British way of doing things, as anyone can see in the course of a walk across Waterloo Bridge.

When the South Metropolitan Gas Company put forward their notable scheme for modernizing the street lighting of South London, the necessity was felt for a new standard lamp-post and lantern. We believe that the Directors of the Company, fully recognizing the truth that matters of Art are not within their province, applied to two or more well-known architects for suitable designs for their new lamp-columns, and were disappointed of their hope. In the end, they had to fall back upon the first principles of acceptability which they had



A — FIRST PRIZE
B — SECOND PRIZE.
C — HON. MENTION.
D — HON. MENTION.
E — HON. MENTION.

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intended to employ in judging the architects' suggestions, and the concrete result is the now well-known "Eddystone" lamp-post, which has materially contributed to make the streets of Transpontine London—once a byword for the neglect of such matters—an example of good work in this kind. What, then, are the points of a good street lamp-post? We will run through them—leaving it to be understood, of course, that there may, and should, be many realizations of them besides the named example; although, if any of the essentials are lacking, the result must be to that extent defective. In the first place, a lamp-post intended for indefinite multiplication anywhere and everywhere must be unobtrusive. Like a good waiter, it must be perfectly neat and well-looking, but have nothing about it to attract attention to itself and away from its purpose. Neither must it *afficher* itself by a definite style, or date, or trickery of any kind; as will be understood when it is remembered that it must stand indifferently before a public-house or a church. Special lamps may be provided for particular sites and surroundings; but these are not in question.

Next, the lamp-post must combine sufficient solidity and weight with the smallest practicable occupation of public ground space. It must not look too slight nor too heavy for its place and purpose. Perhaps the base of the "Eddystone" post is just a thought too bulky. Especially is this consideration suggested by the fact of street lamp-posts having so generally to be set farther into the side-walk than the kerb-line which they formerly occupied, for reasons connected with the wheeled traffic. Arising out of this requirement is the need for suppressing all spiky, or knobby, or filigree ornamentation, which might injure wayfarers and will certainly harbour dirt. The stouter the lamp-post, in reason, the better for the action of the light, whether this be gas or electricity. The body of the post should be large enough to ensure its being seen and avoided by the most absent-minded passer-by; and this will also ensure its steadiness as a support for lights, which are more delicately fashioned than of yore.

A lamp-post should have a beginning, a continuation, and an end, like any other work of art. The beginnining is the base; the continuation is the shaft; and the end is the lantern. These parts should all be harmonious, but distinct, as their offices are not at all the same.

Having sketched in general terms the points of a good lamp-post, we can proceed to criticize the set of designs which accompany

this article, and are reproduced here by the courtesy of the Editor of "The Studio," who received them for one of the competitions organized by that attractive publication. The winner of the first prize is Mr. J. P. Hully, of Lancaster; of the second prize, Mr. David Veazey, of Woolwich; and Messrs. J. P. Hully and Bertram Ashworth share the honourable mentions. It is very gratifying to find artists interesting themselves in the design of street lamp-posts, which usually indicate that art has had little to do with their coming into existence; and it is to be hoped that any maker of these goods who may take advantage in whole or in part of the designs so evoked will not forget to make suitable acknowledgment of the debt.

We cannot bestow unqualified praise upon any of the designs as they now appear, though there is not very much amiss with either of the two prize patterns, or with Patterns D and E. The base of A is very good. The upper edge of it is too sharp, which could be easily altered without detriment to the design. The shaft would look better if the profile were hollowed like the growth of a tree stem; and the same observation applies to all such shafts. The alteration is so slight as to be difficult to draw on a small scale; but the difference in the real thing is immense. A perfectly straight taper is irredeemably mechanical-looking, clumsy, and vulgar. Mr. Ashworth, in pattern D, has excelled in recognizing the importance of the ladder-rest. We should greatly like to see an example of these cleverly-designed posts in a suburban road. They are scarcely grave enough for a street; but they would certainly please at Bournemouth. The ladder-rests in the first prize design are too accidental. Their attachment should be strengthened and their arms lengthened. The method of suspending the lantern in this example is too weak. It is better in pattern E; but the designer did not know that three panes are better than four, on account of the shadows. His lantern is a glass bucket; which is too costly. The second prize design is almost too pretty for general use. The base is rather weak, and the top ornamentation of the shaft questionable. The use of the ladder-rests is misunderstood; and the notion of making them flat, to bear the street name, is a mistake. They are in shadow at night. The lantern is more suitable for a restaurant approach than for street lighting. Pattern C is simply funny. It suggests a cap and bells; and, of course, an object that is recognized as "like" something else has missed its proper mark. Pattern E is so plain and matter-of-fact a design that it might have come out of a street in Westminster. It is none the worse for that. With the shaft-taper corrected, the lamp-rests strengthened, and a practicable lantern, this example would do for anywhere in North London, where they badly need a good standard lamp-post.

Before leaving this subject, which is so attractive that we could go on discussing it to almost any length, it may be helpful to all who are at any time engaged in making or selecting street-lamp designs, to point out that not much assistance is to be had from antique work in this line. The ancients, when they wanted a light to see their way about, carried it themselves. So well was this rule understood, that such fixed lights as were exhibited were more properly warning than illuminating points. The ancient public light was of the nature of a beacon. They could not make it anything else. The phrase "a lantern to the feet" beautifully expresses the whole need of those who desired light upon their road. There is nothing better, as everyone knows who has had occasion to walk abroad after nightfall in the country—the region that has been wittily defined as "the place beyond the street-lamps." But a horn lantern, while all that is really necessary when carried in the hand, is quite ineffectual when fixed on a post overhead, except as an indication of something to keep away from. Illuminating power is of no moment when the purpose is merely to "show a light." A single candle, as Shakspeare observed, can shed its beams to a great distance on a dark, clear night. The heavy old lanterns that yet remain upon the parapets of some ancient bridges, and at the entrance of old houses, would not give much light even if an electric arc lamp were put inside them. A candle suits them better. It is only within living memory that the purpose of public street lighting was changed to the actual illumination of the ground, and this required a complete reconstruction of the lanterns from the old beacon standard. A certain sacrifice of picturesqueness was entailed by the change; since there is no denying that a Chinese lantern is prettier than the most powerful modern arc or gas lamp. It is desirable that this truth should be remembered whenever questions of public lighting are mooted.

Scarcity of Tar in France and Belgium.—In a recent number of the "Revista Minera," attention was called to the scarcity of tar in Belgium and France, owing to the quantities employed to lay the dust on roads. It was stated that the price had gone up to 80 frs. (64s.) per metric ton; and that manufacturers of compressed fuel were looking round anxiously to find the large quantities requisite for their industry. It was suggested that the use of tar on roads should only be resorted to in exceptional cases, as it could be better employed in the manufacture of compressed fuel, especially in Spain, where large quantities are made. If tar is worth, as it is reported to be, 60 frs. (48s.) per metric ton in France, the "Revista Minera" thinks that in the briquette works of Spain it would be worth at least 120 frs. (96s.). Every ton of compressed fuel requires in its manufacture 23 or 24 kilos. (50 or or 53 lbs.) of tar.

TECHNICAL RECORD.

SOUTHERN DISTRICT ASSOCIATION OF GAS ENGINEERS AND MANAGERS.

The Annual Meeting of the Association was held on Thursday, at the Hotel Cecil, Strand. On the retiring PRESIDENT (Mr. W. E. Price, of Hampton Wick) taking the chair, he faced an excellent number of members from all parts of the Association's extensive district.

The first business was the confirmation of the minutes of the previous meeting, which, on the suggestion of the President, were taken as read.

ANNUAL REPORT.

The HON. SECRETARY (Mr. J. W. Helps, of Croydon) read the annual report of the Committee. It contains several items of interest; and therefore it is reproduced *in extenso*:—

The Committee have pleasure in presenting their twenty-eighth annual report of the progress of the Association during the past year.

During the period under review, 6 names have been added to the roll of membership, 5 have resigned, 5 cut off as per Rule 19, and one removed by death; leaving a total of 157, as compared with 162 at the end of 1901.

The March meeting held at the Cannon Street Hotel, under the presidency of Mr. W. E. Price, of Hampton Wick, was highly successful. A large gathering of members had the pleasure of listening to the opening address of the President, which was bristling with practical suggestions and facts. His invitation to junior members to assist with contribution of papers was couched in words that were very human, and which should not fail to spur them into action.

The address was followed by the adjourned discussion on Mr. Charles Carpenter's paper on "Experiences with Reversible Condensers," which was of a very interesting character.

The members met at Richmond in June last, and enjoyed a pleasant drive through the park to the Hampton Wick Gas-Works, which are under the control of the President. Their inspection afforded a very interesting object-lesson. The party was afterwards hospitably entertained at lunch by the Directors of the Company. The thanks of the members are due to the Chairman, Directors, and their able Engineer for their courtesy and kindness.

After luncheon, visits were paid to the works of the Southwark and Vauxhall and Grand Junction Water Companies, which proved interesting and instructive.

The closing meeting of the year was held in November at the Hotel Cecil; and after sympathetic reference to the death of a much respected and esteemed Past-President (Mr. Charles Gandon), an interesting paper was read by Mr. T. Glover on "Further Suggestions for the Elimination of Naphthalene from Coal Gas," which was followed by an excellent discussion.

Following a report by the Secretary as to the progress of the naphthalene investigation, Dr. Colman gave a description of his method of estimating the amount of naphthalene in coal gas, which was listened to with much interest by the members.

The naphthalene question, the Committee feel, has absorbed a great deal of the time of the Association during the past year; but they have reason to hope that the above papers, and the discussions thereon, will prove of great value in assisting the members in dealing with this troublesome compound.

The Naphthalene Committee have met on several occasions during the past year, and have issued a circular to the members asking for particulars of the methods of manufacture at their various works, and the systems adopted (if any) for the elimination of naphthalene. The members have loyally responded, and some very valuable information has been placed in the hands of the Committee. The returns have been submitted to Dr. Colman; and his report thereon will be submitted to the members at the meeting on March 19 next.

The balance standing to the credit of the Association at the commencement of 1902 was £103 11s. 5d. The receipts during the year amounted to £81 18s., and the expenditure to £78 17s. 2d.; leaving a sum of £106 12s. 3d. to carry forward. The usual copies of the "Reports of Gas Associations" were presented to the members; and this absorbed the sum of £37.

The Committee feel that the best thanks of the members are due to the President and Secretary for their valuable services during the year.

On the motion of Mr. R. HERRING (Dover), seconded by Mr. T. GLOVER (Norwich), the report was adopted.

THE RETIRING AND NEW PRESIDENTS.

The PRESIDENT said the time had now come for him to retire from the chair, and give place to a gentleman who was better able to fulfil the duties than he had been. It was somewhat new for him (Mr. Price) to take up such a position as this; and he must therefore ask the members to forgive any shortcomings that there might have been during the past year. He had, however, done his best; and he could only hope that the members had been satisfied with the meetings, any success connected with which had, of course, not been due to his efforts entirely. The greater credit was due to the endeavours of the able Secretary and the Committee. From that day, they were going to see an improvement; and he had much pleasure in retiring from the chair, in order to give place to Mr. Tysoe.

The new President, Mr. J. TYSOE, of East Greenwich, was heartily applauded on taking the chair.

The PRESIDENT remarked that he was sorry that one of his

first acts in the presidential chair must be to disagree with his predecessor. He was afraid he could not altogether accept Mr. Price's statement that he was making place for a better order of things than had obtained in the past. He was sure everyone present was fully satisfied with the endeavours Mr. Price had made to carry on the business of the Association in a satisfactory manner; and there was no question that he had succeeded admirably in doing it. However, it was his (the President's) duty to propose that the heartiest vote of thanks be given to the retiring President for his conduct in the office during the year.

Mr. C. E. BOTLEY (Hastings) had much pleasure in seconding the motion. Although he had not, through circumstances beyond his control, been able to be present at the meetings, from what he had heard and had read of the proceedings in the technical press, the year had been a most enjoyable one.

The motion was carried by acclamation.

Mr. PRICE, in response, said it was very kind of the members to pass this vote of thanks, though he did not think there was any necessity for it, as he did not believe he deserved it. However, it had been to him a very pleasant year. The whole of the meetings—of the members, of the Committee, and of the Naphthalene Committee—had been very enjoyable ones. But he must say that neither he nor any other President could do anything without the help and guidance of their worthy and experienced Secretary. It was he who supported the President, and who "kept the show running." He (Mr. Price) had had much pleasure in occupying the chair; and he heartily thanked the members for having given him the opportunity of doing so.

NEW MEMBERS.

The HON. SECRETARY read the list of nominations for membership. It was as follows: Mr. Charles Hunt, Westminster; Mr. T. N. Ritson, of Ramsgate; Mr. T. Ebenezer Pye, of Sandwich; Mr. John O. Whitaker, of Portland; Mr. A. R. Burch, of Uxbridge; Mr. C. Foster Veevers, of Northfleet; Mr. J. W. Wilson, of Uckfield; and Mr. J. Paterson, of Redhill.

On the proposition of the PRESIDENT, seconded by Mr. A. E. BROADBERRY (Tottenham), these gentlemen were unanimously elected.

The PRESIDENT then delivered the following

INAUGURAL ADDRESS.

Gentlemen,—My first duty is to sincerely thank you for the honour you have done me in electing me to the position of your President for the current year; and I wish to express my full appreciation of the feeling that has prompted you to place this position within my reach. I cannot claim to be qualified in any way to add lustre to the records of the office; and perhaps when I came to think calmly over the matter, I was not unduly elated at the prospect before me. But I hope, with your kind co-operation—on which I know I may rely—to at least maintain this Association in the elevated position which it occupies, owing mainly to the efforts of my predecessors in this chair. I once heard it said that presidential addresses are a mistake and quite unnecessary, as they serve no useful purpose, and are perpetuated simply because it is the custom; that it would be better in every way to abolish them; and that it was only necessary for some one to make a start. At that time, this view of presidential addresses possessed but little interest for me. Owing to my present position, however, I have been sorely tempted to immortalize myself by initiating the innovation—of course, with the sole object of relieving future presidents of a heavy responsibility; but being afraid that my motives might be misunderstood, I will leave the matter to someone possessing a higher degree of moral courage than I can lay claim to.

In framing this address, I do not propose to occupy your time with theories and speculations, or statistics concerning the profession, which are readily obtainable by all desiring such information; nor will I follow the custom much in favour in presidential addresses, of passing in review the prominent events of the year, as probably many of you are better acquainted with them than I am. I will rather try to interest you with a record of matters appertaining to the practical part of the industry with which we are associated; confining myself mainly in such records to the inside of the boundaries of the works under my charge. For the past 22 of the 32 years in which I have been striving to make myself acquainted with the business of the gas manufacturer, it has been my lot to be engaged in works in which the operations have been carried on on a large scale; and I am not sure that this is a condition of things which places one in the best position for acquiring a complete mastery of all the details of the profession—if, indeed, any position affords that opportunity. To one entering the profession, I would without hesitation recommend a small works as one in which he would be more likely to gain an all-round knowledge, and gain it in a more thorough manner. In a small works, where everything is more concentrated, I think a young man is more likely to secure a substantial foundation for the receipt of his subsequent learning than in a large works, where there is a danger of becoming more or less specialized owing to everything being as it were on an overwhelming scale such as to preclude the possibility of obtaining a good sound knowledge of all departments. And, further, in most large works the opportunities of becoming practically acquainted with district work are entirely absent.

I did not intend at the outset to air my views on the training of youth, about which so much has recently been said in addresses and elsewhere; but having touched the fringe of the subject, I will just say that this doubtless is an all-important matter in view of the future of our industry, whose destinies will be controlled for a time by the youth of the present day. There is, however, a danger of a tendency to appraise at too high a value the possession by one who has to control a business of the nature of ours, of a high degree of technical knowledge. This is all very well in its way; but a good training in habits of observation, in which all knowledge begins, and the exercise of common sense and the practice of finding a reason for everything, will carry a man a long way. Gas making is a business the essential feature of which is that it must pay to run it; and it is possible to run it on too technical lines, and for the management to waste a lot of time in testing and investigating—operations which may be highly interesting in themselves, but which may not advance the material interests of the concern, and may distract attention from practical matters which may have considerably more influence on the working results. Technical knowledge is, of course, desirable and useful, but too much must not be made of it. A man with the true commercial instinct, and the necessary amount of energy, is more fitted for the control of a modern gas-works than the man with half-a-dozen letters at the end of his name, indicating the possession of high scientific attainments but without the tact or knowledge necessary for the control of men, or the readiness of resource in an emergency so essential in a business of the nature of ours. As an instance of what I mean, I think it may sometimes happen that five minutes spent in waking up the firemen may have a better effect on the manufacturing operations than days spent in scientific investigations of the reasons for inferior results.

I was much interested a short time ago in reading of a movement which had originated in Germany for the training of gas-works foremen, as I have for a long time felt that the difficulties in the way of obtaining suitable foremen for the various departments of a gas-works were not the least of the troubles connected with the carrying on of the concern. It cannot be denied that efficient foremen are of the utmost importance; and by efficient I mean not only the efficiency due to a possession of the requisite knowledge of the business, but with the capacity and the desire to discriminate between right and wrong, the desire to do justice to the man as well as to the master, and the possession of tact and common sense. A foreman wanting in these qualities may, and frequently does, create situations which give the manager no end of difficulty to straighten out. This holds good especially in large works, where, of necessity, many details must be left to a foreman, and he wields considerable power for good or evil. A curious instance of the want of common sense in a foreman once came to my notice. Many years ago, I considered, rightly or wrongly, that the larger the amount of clean water passed through the scrubbers within certain limits, the more ammonia would be recovered per ton of coal; and on one occasion, finding the liquor of a higher strength than usual, I told the foreman to reduce it—intending, of course, that the supply of water to the scrubbers should be increased. The following day he informed me, with visible satisfaction, that he had got the strength down all right, as he had put in a temporary water supply to the liquor wells, and had been running water in all night.

We are all agreed that the periodical meetings of gas engineers, and the interchange of ideas, is of immense benefit to the undertakings in their charge; and I see no reason why the gas-works foremen should not have an organization of their own on similar lines. It could not fail to be of very considerable educational advantage to themselves; and, as a natural consequence, it would increase their efficiency in the positions held by them. I am quite sure that gas companies would find it to their interests to afford facilities for their foremen to meet in this way; and I mention the matter as one that at least deserves consideration.

Attention has recently been directed in the public Press to the practice introduced by some firms in America and in this country of giving bonuses for improvements made in the methods of working, and new ideas tending to the increase of efficiency by the workmen's initiative. This is by no means a new thing, and was introduced into the South Metropolitan Gas Company by Sir George Livesey years since; and many workman can testify to the advantages accruing to themselves by reason of the introduction of the system. I am afraid it is only too true that in many cases—I am not speaking now of the South Metropolitan Company—the suggestions of workmen have not been received in the proper spirit, or the credit of their suggestions has been annexed by officials; and this has resulted in their being discouraged from ventilating their ideas. I am quite sure that a systematic arrangement for the transmission of the workmen's ideas to the responsible head of the works could not fail to be productive of mutual benefit to workmen and employer, and would also serve in some measure to bridge the gulf that too often exists between capital and labour, by giving to the employee an interest in his work beyond that of the mere weekly wage. In this sense, it is an adjunct to the profit-sharing system, the introduction of which into the South Metropolitan Gas Company has been attended with such marked success.

I do not propose to devote any portion of this address to a consideration of profit-sharing—though it is one upon which time could be profitably spent—but will content myself with saying that

it has always been a source of surprise to me that, in view of the well-known success that has attended the introduction of the system into the business of the South Metropolitan Gas Company, and the abundance of proof which is available of the undoubted advantages to all connected therewith, including the consumers, that so few gas companies have followed the good example set before them. When I state that large numbers of men who never had a penny beyond their weekly wage have been taught to realize the possibility of providing something substantial for the future, and have actually so provided to the extent of £160,000, enough will have been said to demonstrate the reality of the success of the scheme.

In a paper dealing with gas manufacture, the retorts and retort-house practice must naturally take a prominent position, as they constitute the mainspring of the whole subject. It is my experience that when matters in the carbonizing department are on a satisfactory footing, troubles elsewhere may be regarded with a certain amount of equanimity. I might almost go so far as to say that when the retort-house is right everything else is right. It is an old saying that dividends are made in the retort-house; but I am inclined to run it more closely home, and say that they are made in the furnaces. When it is remembered what effect an apparently trivial alteration in a furnace has upon the heat of a setting, it will at once be seen what enormous influence the proper care and supervision of the furnaces must have upon the results of carbonization. One point in connection with furnaces was a source of considerable trouble to me—that was the maintenance of a satisfactory seal at the feeding door of the generator. Self-sealing lids, I found to be out of the question; and for a long time I used wet breeze hammered into the neck of the furnace, so as to form a plug, the frame being fitted with an iron cover. This answered fairly well; but many of them burnt through before the time arrived for refilling, and the air passing in could not fail to adversely affect the heat of the setting. The iron doors were also quickly destroyed. One day I was paying a visit to Mr. Shoubridge at the Crystal Palace District Gas-Works, and noticed that he was using spent lime for plugging the feeding holes. I immediately annexed the idea, and wondered why it had not occurred to me before; and I here express my indebtedness to our friend Mr. Shoubridge, as the benefit I have derived from this method of sealing the furnaces is very considerable.

It is of very great help to us on Sundays, when the work is shut down for twelve hours, as the plugs generally remain intact all day; whereas with the breeze plugs, the iron covers became red hot very early in the day. An unexpected development took place when we first commenced to use spent lime for this purpose, which, I was afraid, would prevent its continuation. A great deal of our pan breeze is screened and sold for making concrete; and one day I was informed that a load had been sent back by a builder because the lime in it spoiled the cement and prevented the concrete setting. This had not entered into my calculations, and I was alarmed lest it might upset all the arrangements. But I could not conceive it possible that spent lime, after passing through the furnace on its way to the ash-pan, where it would be further subject to a washing process, could have such an effect; so I had some concrete blocks made and tested, and found that the lime had absolutely no injurious action on the cement. I afterwards learned that the customer making the complaint had not used the material, but having heard that lime was mixed with the breeze, assumed it must be injurious. In the course of twelve months, we used about 12,000 yards of breeze for sealing the furnaces. This is now sold, and is probably all profit, as, when used in the furnaces, I think its value as fuel was *nil*. We do not use more than half this quantity of lime, as its binding properties are so much greater than breeze; but assuming that 6000 or 7000 yards are used in the twelve months, this is no inconsiderable advantage to us in retarding the rate at which our available tip is being filled up.

Another point of supreme importance in retort-house practice is that of the vacuum. This may seem elementary; but I make no apology for mentioning it, as I am satisfied that in many cases it does not meet with the attention it deserves. The maintenance of the vacuum at a constant level in the retort-house is, in my opinion, worth any amount of money and labour in its attainment. I expended a considerable amount of both before meeting with success; but that it was well spent, admits of no doubt. At East Greenwich, each house consists of three benches of 15 beds of tens, with a separate off-take from each bench leading into one trunk main. In common with most works, our practice was to take off the gas at one end of the bench, and to govern the vacuum with a throttle valve on a bye-pass worked by a governor. Owing to the length of the bench throughout which the gas had to travel, as much as 5-10ths difference in vacuum was frequently shown at the two ends. Moreover, it was impossible to maintain the vacuum at the three sections at anything like uniformity or regularity. Various expedients were tried at different times, but without effecting much improvement. Success was finally attained, however, by taking the gas off at the middle of each section, and causing it all to pass through an equilibrium governor. This enables us to maintain practically a constant vacuum at any desired level; the governor bell being weighted according to requirements, as is the case with a district governor. A pressure recorder is placed at each section, the papers from which are taken into the office every morning, and a check is thus kept upon the operations.

On the change from 16 to 14 candle gas, and the necessity for an increased make per ton to compensate for the reduction in the initial price of gas, my attention was turned to the method of shutting down the work on Sunday mornings for the usual twelve hours cessation from gas making with a view to further economy. The Sunday stoppage means a loss, however it is carried out; but that it is the right course to adopt I think no one here will venture to dispute. After trying various methods, I believe that now adopted is as convenient and satisfactory as any that can be devised; and although it may not be new to many of you, I venture to describe it, in the hope that it may be of interest to some. The last charge of the Saturday night shift is put in at 5 o'clock on Sunday morning; and as we have a draw every hour, this would, in the ordinary way, follow on at about 6. But at this hour, all that is done is to slacken the levers of the mouthpieces of those retorts due to come off, so that the poor gas which is then being produced may not go forward. The same procedure is carried out each hour till 10 or 10.30 o'clock, at which time nearly all the illuminating gas has been driven off, as is shown by the jet photometer, and the exhauster is stopped, the inlet-valve to the washers closed, and all the mouthpiece levers are tightened up again.

Gas of doubtful quality is still being evolved; and to prevent a rise of pressure, and a consequent blowing of the gauges and governors, a safety seal is provided at the condensers, set to blow at 2 inches of pressure. Consequently the retorts and apparatus up to the inlet of the washers can never have more than 2 inches upon them. It frequently happens that sufficient gas is continuously driven off after the exhauster is stopped to maintain a slight pressure up to starting time in the evening; but should the pressure entirely disappear before that time, sufficient gas may be admitted to restore it by means of a 2-inch bye-pass at the inlet-valve to the washers. On restarting the works, all that is necessary is, after a few retorts have been charged, to open the washer valve, and close the safety seal at the condensers. By this method, all risk of explosion in the hydraulic mains, of which many of us have probably had experience, is entirely obviated, perfect safety is secured, and very little good gas is lost.

There appears to be but small prospect of an agreement among gas engineers on the subject of inclined retorts, with the necessary machinery, *versus* horizontals with machinery, judging by what has been written and said on the subject. After all, it is probably a consideration of local conditions and circumstances that must be the guide in the matter. A comparison of the published figures purporting to represent the cost of the two systems does not seem to help us much, as they vary so greatly. A suggestion made by Mr. W. R. Herring, of Edinburgh, at the last annual meeting of the Institution of Gas Engineers, for the unification of the methods of stating carbonizing costs, would, if given effect to, be of great assistance in settling many questions; and perhaps we may hope, now that the unification of the two representative Gas Institutions is happily an accomplished fact, their combined intelligence may be brought to bear upon a consideration of the matter.

With the facilities for the application of machinery at East Greenwich, I have no hesitation in saying that the inclined system could not compete with it there, either on the score of efficiency or economy. When a retort-house is equipped with machinery, it is obviously productive of economy to work it to its fullest extent. With West's wire-rope driven machines, we are able to work 350 retorts—that is to say, with one charger and one rake, 700 charges of 3½ cwt., more or less, are put in and drawn out in one shift of twelve hours. To do this, there is not much rest for the machines; but a reasonable time is available for cleaning down and oiling, and also for the execution of small repairs. In order that the men engaged on the machines may have suitable intervals of rest for meals, relief men are employed; and with two such men the machines are able to work an additional 50 retorts, and we thus get full value out of them. As regards cost of installation, I find that the total for 350 retorts, including all the outlay on machines and everything within the four walls of the retort-house, but excluding foundations of the house itself, works out at £3 11s. per lineal foot of retort. I know of no installation of inclined retorts on which the outlay, taking the same items, was less than £6 per lineal foot of retort, and in many cases it is much more.

In retort-houses where machinery cannot be worked to the full extent of its powers, much no doubt may be said in favour of the introduction of inclined retorts; but given an efficient stoking machine and plenty of scope for its energies, it is, in my opinion, more competent to deal with the all-round conditions of carbonizing than any other system as yet introduced. Not many years since, an experienced gas engineer stated that the utmost extent to which he considered it justifiable to go in the direction of the application of stoking machinery was to that necessary to take up the extra make during the winter months; and this was mainly with the object of surmounting the labour difficulties during that period. I venture to say that no one would endorse that opinion at the present day. I would not advise the equipment with machinery of the whole of the carbonizing plant, as necessarily some portion of it would only be in operation for a week or so out of the twelve months; but on the basis of the work performed at East Greenwich, I find that if machinery is in use for five weeks in the year, the saving effected as compared with hand work, is sufficient to pay 5 per cent. interest for twelve months, and this indicates the limit of the economical application of machinery.

The time may not be far distant when gas engineers will have to recognize the possibilities of the so-called retort-oven, which may be destined to play an important part in the gas making of the future. In America, this question is rapidly coming to the front, and illuminating gas from coke-ovens is being sold to gas companies at a price less than the companies can make it by the ordinary methods. It cannot be denied that the method of carbonizing in the retort-oven is vastly superior to that of the ordinary gas-retort. An oven is charged in about 4 minutes with from 6 to 10 tons of coal; and when the charge is burnt off, the coke is expelled by a ram, actuated by steam or other motive power, in about the same time. In manufacturing undertakings, labour saving is one of the most important factors of success; and in the working of retort-ovens this is carried to a point beyond which it would appear impossible to go. This aspect of the subject cannot therefore fail to appeal to gas engineers; but there are other considerations, from which it would appear that the time for the introduction of the system into the gas-works of this country is by no means ripe.

What with the London County Council with their watchful care of the illuminating power and purity of the gas, the Factory Inspector with his requirements for minimizing the risk of accidents from machinery in motion, the Thames Conservancy and their tests of the discharge from the works into the river, and the local authorities with their observations of the density of the smoke emitted from chimneys, the London gas engineer of the present day has a good deal of occupation for his mind which did not come into the life of the last generation. Whether the sum of human happiness is increased by the imposition of all these restrictions and regulations may be open to question; but that it detracts from the pleasures of existence of the individual gas engineer admits of no doubt.

With regard to gas testing, recent legislation has served to remove what was an ever present source of worry—I allude to the reduction in the illuminating power from 16 to 14 candles. It is now possible to make gas of the standard illuminating power with the almost certainty that it will reach the testing-station, miles away, without depositing any appreciable quantity of its light-giving constituents on the way. What this means for the man responsible for the quality, no one who has not been in that position can possibly realize. I realize and fully appreciate the relief every day; and as it is the generally accepted idea that worry is more fatal to existence than hard work, I believe many days of life will accrue to me in consequence of the change.

It has often occurred to me that, in their relation with various public bodies, gas companies are frequently placed at very great disadvantage by reason of the partial or total ignorance of the work and the aims and objects of gas companies more or less generally shown by these governing bodies; and I have felt that if in some way we could be represented on them, mutual benefit would result. I have had opportunities of discussing matters of gas supply with members of these bodies, and they have appeared rather surprised to learn that there are gas companies whose business is carried on in an honest and straightforward manner, and were almost incredulous when I stated that directors of gas companies held it to be the first duty of the engineer to see that the illuminating power and purity of the gas were above the statutory requirements. I also pointed out that it is certainly the interest of the engineers to see that this is complied with, as any falling short subjects him not only to an unpleasant interview with his directors, but probably to the indignity of an appearance at the local police court, to spend an hour or two in the evil-smelling company of the friends of some drunk and disorderly cases, between the hearing of which the gas company's prosecution may be sandwiched. This has been my unfortunate position on more than one occasion. I well remember my last appearance at a police court in connection with this subject; and I took what comfort I could from the fact that one of the Gas Referees, whom the Company had subpœnaed, was present, and was undergoing the same ordeal. Knowing as we do so well that occasional lapses in illuminating power or purity of the gas supplied to the public occur, not because of what we do, but in spite of all we may do, it is not unreasonable to ask that some reform be made in the method employed to convict the Company —at any rate, we might be spared the necessity of appearing at a Court, the principal function of which is the administration of well-deserved punishment to criminals.

Now that the supply of illuminant to the public is not so much in the nature of a monopoly as it once was, the necessity for such stringent testing as exists in London is no longer apparent. In face of the competition of electric light, the gas companies might very well be given a freer hand in the matter of the purity of the gas supplied by them, as, in their own interests, they would take care that their customers were not prejudiced in any way, as that would result in loss of business. The large sums spent in reducing the sulphur compounds to an arbitrary limit, and ensuring the complete removal of sulphuretted hydrogen, are, in my opinion, quite wasted; whereas, if these matters were left to the Companies, a saving of over £100,000 a year could be effected by the three London Companies, and most of this would no doubt go to the consumers by way of a reduced charge for gas. Seeing that probably the larger proportion of the gas consumed is required for heating, cooking, motive power, and lighting the streets, in which the presence of bisulphide of carbon and minute quantities of sulphuretted hydrogen is absolutely a matter of indifference, I am satisfied that if the whole of the bisulphide were allowed to remain in the gas, no effects other than those with the present maximum of 22 grains would be observable or produced. Speaking generally, it is a pity that Parliament does not let things alone a bit more, and allow them to develop. It is time enough to impose restrictions when it is proved that a certain course is wrong. I have other industries in my mind in which the restrictive enactments passed have tended to check progress and hamper legitimate business.

Coming, now, to the factory inspector. In a concern run upon the lines of that with which I have the honour to be connected, where all possible precaution is taken for the prevention of accidents, and where, in fact, special attention is paid to the subject, there is not much left for the inspector to suggest. There have been occasions when supposed safeguards have been enforced against my own views of the requirements; and these have been responsible for the accidents which they were intended to prevent. It may be well at this point to give some account of the methods adopted by the South Metropolitan Gas Company to prevent accidents. We recognize that the underlying principle of all peace operations is that they should be conceived and carried out with all possible safeguards to the men engaged; and to that end we impress upon the workmen the importance of the part they bear, and the responsibility which is placed upon them, of adopting every precaution in carrying on their work. An accident, however slight, is brought before a Jury of twelve workmen The fullest evidence is brought before them; and in serious cases they inspect the scene of the accident, and afterwards retire to consider their verdict. In all cases of disagreement, a two-thirds majority carries the point; and the voting is by ballot.

It is gratifying to notice that the juries have a due sense of the responsibilities and requirements of their position, and are desirous of doing strict justice, as exemplified by the fact that it is not an uncommon thing for a verdict to be recorded against the Company. The Engineer of the station presides at the inquiry; the Jury being changed every month. The importance of the co-operation and assistance of all men in preventing accidents is always emphasized, and they are asked to call the attention of foremen to anything that, in their opinion, is unsafe or may lead to an accident. This is a point of very great importance, as men engaged in the various operations may be in a position to observe defects which might easily escape the notice of a foreman. As a matter of fact, we do get valuable assistance from this source; and I have frequently carried out recommendations emanating from workmen intended to increase their own security. That our system is a good one, we have, I think, abundant evidence in the fact that the percentage of accidents has been gradually diminishing, and is now one-third less than it was some years ago. But with all one's care accidents cannot be avoided, because they frequently come from an unexpected quarter. My experience leads me to think, and lapse of time confirms the opinion, that the most dangerous operations are the safest; and I think if you examine that statement carefully, it will not appear so foolish as it does at first. When a particular work is known to be attended with certain risks, due precautions are taken to minimize them, and extra care is exercised by everybody concerned. In that way, the element of danger is practically eliminated; whereas, with an ordinary job, nobody thinks of danger, something that could not be foreseen goes wrong, the unexpected happens, and a coroner's jury says the employer did not exercise proper supervision, or was careless in carrying out the work.

A word here as to coroners' juries. It has been my misfortune to appear before several; and the principle, or want of it, which seems to guide them is to make every effort to convict the employer of negligence. Justice is a secondary consideration; the main thing being a verdict that will, as they think, enable the relatives to make a claim for compensation. Not long since, I was present at an inquest, when the foreman of the Jury fought very hard for a verdict of carelessness against the Company. But the Coroner pointed out that the evidence was in the contrary direction, and the reply was: "Well it is a wealthy Company, and they can afford to pay." I am afraid that consideration influences the action of many people in their dealings with gas companies.

Before leaving the subject of accidents, I wish to mention one, attended with fatal consequences, which happened last year at East Greenwich. It was of an exceptional character, and a knowledge of the facts might possibly be the means of preventing a similar occurrence at other works. The blow-off pipes from a range of four Lancashire boilers were connected into a 6-inch cast-iron pipe discharging into the river about 40 feet distant. While running out the usual daily quantity of water from one of these boilers, a portion of this pipe under the stoke-hole floor blew up, and the fireman, who was unfortunately just over the spot, was scalded in such a manner as to result in his death. Subsequent examination showed that the 6-inch pipe at this point was badly corroded, owing to wet ashes, which had found their way to it through the joints in the iron plates of which the stoke-hole floor was formed. The pipe had been in two years, and it was matter of surprise that the corrosion had been so rapid.

I have since talked over the matter with many managers of works of various kinds where steam-boilers are employed. They, like myself, never suspected danger from this source, and immediately set about an examination of their blow-off pipes. It is a common thing for blow-off pipes to be led into earthenware

drain pipes, and I have known wood casing to be used. In the case in question, it is probable that the blow-off cock was opened too quickly, as the pressure must have been very considerable to have lifted the iron floor-plates to the extent that it did. This shows the advisability of a periodical examination of blow-off pipes; and if the foregoing recital of my experience should lead others to look more closely into the matter and lead to the detection of weakness, the time occupied in drawing your attention to it will not have been altogether wasted.

As to the requirements of the Thames Conservancy, this is an infliction of a more recent date, and no doubt much can be said in favour of the regulations enforced by that body. But one feels rebelliously inclined when, after paying handsomely for the privilege of taking a supply of a mixture of water and mud from the river (in which at times the mud predominates), one is allowed to return the water after using it, but not the mud which has settled out of it, or, if you have the misfortune to sink a barge on the foreshore which the receding tide leaves half full of mud, you are told that the mud must not be re-deposited in the river, but must be taken ashore. The periodical testing by the Conservators of the discharge into the river from various pipes is, I must admit, necessary in the interests of the purity of the Thames; but it is none the less irksome, and requires great care and continual watchfulness to maintain the effluent at the desired degree of purity.

With the efforts of the local governing bodies in the direction of the prevention of smoke, I am more in sympathy, although I have occasionally had reason to fervently hope that the Inspector's gaze has been turned in a direction other than that of East Greenwich. It is no doubt for the general welfare that the emission of smoke should be minimized as much as possible, and by pressing the introductiou of gas-engines and gas-stoves we not only confer a benefit upon the public generally, but help forward our own business at the same time. Do we as manufacturers of coke and breeze do as much as we might in bringing to the notice of the users of steam power the advantages of these fuels, not only in their absolute freedom from smoke, but from an economical point of view? Practically all the steam required at East Greenwich, excluding locomotives, is raised by means of coke breeze in Lancashire boilers fitted with forced draught furnaces of various types. At one time, coke was used exclusively; but in our striving for economy, this had to give place to breeze. I have made many experiments for the purpose of demonstrating the respective merits of coke, breeze, and tar for steam-raising; and the results are given in the following table.

	Coke.	Breeze.	Tar.
Pounds of water evaporated per pound of fuel	6·4	4·76	11·25
Gallons of water evaporated per hour	577	519	350
Pounds of fuel used	896	1090	310
Price of fuel per ton	13s. 4d.	4s.	1d. pr. gl.
Cost of evaporating 1000 gallons	9s. 3d.	3s. 9d.	6s. 5d.

The boilers are 8 feet diameter 27 feet long; the temperature of feed water being from 55° to 60°. Possibly some of you who have a practical acquaintance with the subject may be disposed to say that these figures do not show a very high duty for the boilers in question, and I am quite prepared to admit that higher evaporative results per hour can be obtained, and I have obtained them myself. But I am of opinion that to publish the results of tests or experiments made under ideal conditions is unfair and misleading. I have therefore stated what is done under ordinary working conditions. The figures speak for themselves; and the saving in the case of breeze will fully justify the increased outlay on boilers rendered necessary by the reduced evaporative power as compared with coke. It is right to add that breeze burning entails an extra expenditure of about 6d. per 1000 gallons for labour, which must be added to the above figure.

In the list of restrictions imposed upon the Metropolitan Companies which I gave earlier in this address, I did not include the Inspectors under the Alkali Act; and it is perhaps fitting that they should be mentioned separately, as my experience of them is that they take quite a different view of their duties from that held by some who are placed in the position of guardians of the public interests. Laws are made not so much for the punishment of criminals as the prevention of crime; and the object of an inspector ought to be not so much to convict an offender as to prevent him committing the offence. The Alkali Inspectors act fully up to this idea; and being experts in sulphate and acid making, they fully place their experience at our disposal, and thus materially assist in carrying out the operations in such manner as to avoid infringement of Acts of Parliament which it is their duty to uphold.

I approach the subject of naphthalene with some diffidence. So many theories are brought forward for the solution of the difficulty, and such conflicting opinions exist, that it would appear we are getting little, if any, nearer to the time when we may be able to say that the enemy has been overcome. When we are told that in one place naphthalene disappears if the temperature is not allowed to fall below 70° at the outlet of the condensers, and that at other places the only way to eliminate it is to maintain the temperature as nearly as possible at that of the air, it would seem that local circumstances must be the real guide in settling the question. But even this appears to fail in my case. We have at East Greenwich four retort-houses, each with its separate condensing, exhausting, and purifying plant, all of the same construction. Each series is separated up to the outlet of the meters; and thus there are practically four works with all the conditions identical. One would suppose that what happens in one works would be descriptive of the procedure in all. This is so in most points; but a notable exception is the behaviour of naphthalene. In one works, the condensers have been cleaned out four times during the past twelve months. One of the others, through which a portion of the gas from the first was passing for a considerable time, has also been cleaned out once; but the other two have not been opened for years. In addition, the washers in the first mentioned works give more trouble with stoppages due to the naphthalene deposits than any of the others; so it is not unreasonable to assume that a larger quantity is produced with the gas. But when we come to examine the retort-house methods, we can find nothing to account for it. The same coals are used, the same methods of carbonization carried on, and the arrangements for taking off the gas and tar are identical.

Assuming that naphthalene cannot be retained in the gas up to the burner, the condenser is undoubtedly the proper and most convenient place for its deposition. I have therefore so arranged that they can be steamed out and thoroughly cleaned in twenty-four hours; and there being two condensers to each house, no stoppage of the work is necessary. I think a great deal of the trouble and inconvenience to consumers caused by deposits of naphthalene is owing more to the size and disposition of the service-pipes than to the presence of that substance in the gas. Some consumers are always in trouble, and the force pump is in constant demand; while with others in the same district, using the same gas, a stoppage is a rare occurrence. This can only be accounted for by the assumption that in the former case the arrangements are such as to encourage the deposition; and if it were possible to insist upon definite rules with regard to the laying of service-pipes, it is probable that a large proportion of the naphthalene trouble would disappear.

The introduction of fans in connection with maintaining the pressure in street mains, and for delivery of gas into holders at a distance, is a distinct departure in the way of gas distribution. I believe I am correct in saying that the idea originated with Sir George Livesey some four years since. The late Mr. Frank Livesey, as Chief Engineer to the South Metropolitan Gas Company, placed the carrying out of the arrangements for the first installation in the hands of Mr. Carpenter—at that time the Engineer of the Vauxhall station. The results were of such a satisfactory nature that the extension of the system was decided upon. With the advent of telescopic holders of large diameter, where the top lift is not of sufficient weight to give the required district pressure, the immense advantage of a method of increasing the pressure without risk of overdoing it is apparent. Without this, the upper lifts are for practical purposes quite useless. At East Greenwich, we have four of these fans of the Sturtevant pattern, each capable of delivering from three-quarters of a million to one million cubic feet of gas per hour. They are so arranged that they can be employed either for increasing the district pressure or for supplying gas to other stations. Before the introduction of the fan at East Greenwich, the position was such that we always had 4 million feet of gas locked up in the top lifts of the two holders, available only when the requirements of the district fell below the pressure given by these lifts. Now, however, we can utilize our reserves almost to the last foot. I will not deny there have been moments a little disquieting with one holder aground and the other a few feet only above water level, and I have anxiously watched the clock as it all too slowly progressed towards the hour for reducing pressure. But this condition of things is preferable to that of having 3 or 4 million feet in stock, and no means of sending it out to the public.

The past winter has not brought any undue strain upon gas managers caused by atmospheric conditions; nor do I think much anxiety has been occasioned by the fear of too rapid inroads into our business by the advance of the electric light. The accounts of the gas companies of the kingdom for the past year show that the industry is by no means in a decadent condition; and I venture to say that when the youngest among us will be looking back upon a long life spent in supplying gas to the public, the business will be in as good a position as at the present day.

Mr. T. May (Richmond) said it was his privilege to move a hearty vote of thanks to the President for his address. He was sure all the members would agree that it was an excellent address, bristling with many points of interest, and teaching them, from the source of the President's large experience, many things from which they would benefit. He thought he might say they expected a good deal from Mr. Tysoe when they elected him President; and they were not disappointed.

Mr. G. R. Love (Guildford), in seconding the motion, said he was sure the members disagreed with the President when he said he wanted to introduce an innovation and do away with the President's address. They had listened with the greatest pleasure to the address he had just delivered—an address which was full of good, sound common sense, and great practical utility. Coming from Guildford, where they had a gas examiner and a variety of tests, he was much interested in the President's remarks with reference to town councils and public bodies. He wished Mr. Tysoe was down at Guildford to give the Town Council a little of his common sense and experience. (Laughter.)

The motion was cordially agreed to.

The PRESIDENT, in reply, said not the least of the anxieties connected with the preparation of a presidential address was the doubt that assailed one as to the manner of its reception after it was read. Judging from the kind remarks that had fallen from the proposer and seconder, it appeared that he might have spared himself some considerable anxiety in this respect. It was very kind of the members to express their approval of his humble efforts, and he thanked them sincerely. He would now call upon the Hon. Secretary to make a report on the work of the Naphthalene Inquiry Committee.

THE NAPHTHALENE INVESTIGATION.

The HON. SECRETARY said the members would no doubt have noticed in the report of the Committee a statement to the effect that the returns from those who were written to on the subject of naphthalene had been submitted to Dr. Colman, and that his report thereon would be presented at this meeting. At the time that these words were written, the Committee had not seen Dr. Colman's report, and, when they did receive it and read it, they found it was necessary to depart somewhat from their original idea. The report was a very full one; and it naturally contained certain theories and hypotheses which the Committee thought it was scarcely wise at this juncture to place before the public. Although, of course, the Committee would like the members to know them if they could impart them without the public generally knowing them, they thought it better to keep back the report in full until certain measures had been taken to test the truth of the theories. The Committee hoped that in course of time they would be able to give the members not only these theories, but certain facts as to whether they had been borne out in practice. It was, therefore, decided to prepare from Dr. Colman's report a shorter one to give some idea of the action of the Committee so far, and of their intentions for the future. This short report he proposed, with the President's permission, to now read.

The report was as follows:—

Your Committee have pleasure in presenting the following report on the progress of the Inquiry into the cause of naphthalene deposits.

In response to the circular of inquiry sent out in October last, 88 returns have been made. For the purpose of tabulating and investigating these, your Committee engaged the services of Dr. Harold Colman; and upon his report, the following observations have been founded. It appears that the greatest trouble arises where Durham coal is largely used, as indicated by the table below.

—	Works using more than 50 per Cent. of Durham Coal.		Works using less than 50 per Cent. of Durham Coal.	
	Number.	Per Cent.	Number.	Per Cent.
(*a*) Not troubled . . .	11	20·0	13	43·3
(*b*) Slightly	18	32·7	9	30·0
(*c*) Seriously	26	47·3	8	26·7
Total	55	100·0	30	100·0

Taking this table as a basis, the answers to the questions given in the circular of inquiry were tabulated.

A study of these does not bring to light the existence of any one condition which is always fulfilled in the case of works free from naphthalene, and never present in those which are troubled, or *vice versâ*. Thus the variations in make per ton are not materially different in any of the six tables given in Dr. Colman's report. Carburetted water gas is made in some of the works in each division, and not in others; and while the works using the highest percentage of carburetted water gas is only slightly troubled, the one which comes second to it is very seriously affected.

Again, the relative areas of foul main (covered and uncovered) and condenser area show pretty much the same variations in each table. Atmospheric and water condensers appear indiscriminately in all; and protection from the sun is practised in some works only in each table. In the majority of cases, the hydraulic-main tar is specially drawn off; but in all the divisions except one, cases are found in which this tar flows with the gas to the condensers. The same is true of the answers to two other questions—the percentage of cannel and the quantity of benzol or other enriching fluid used. The cannel amounts in very few cases to as much as 2 per cent.; while the only case in which a large percentage is used (10 per cent. of second-class cannel) is in the undertaking where the naphthalene difficulty appears to be greatest. Enriching spirit is used in very few works, and is not confined to those in any one table.

Although, therefore, each one of the conditions set forth may, and probably does, exert some influence on the removal of naphthalene or its retention in the gas, no single one can be stated to be of vital importance by itself; and so far the returns do not disclose any general principle which must be fulfilled in bringing about the complete removal of the naphthalene in the condensers.

In two cases, however, details are given of matters in relation to the condensers which differ materially from common practice; and in both instances the works concerned—although using exclusively Durham coals, &c., obtaining a high yield per ton—are, and always have been, absolutely free from naphthalene. These two cases will be referred to later.

The number of works in which specific processes have been tried for the prevention of naphthalene deposits is not large. The methods used may be divided into two classes: (1) Those of "prevention"—*i.e.*, those in which the condenser treatment has been modified with a view to complete the removal of the naphthalene therein; and (2) those of "cure," in which the gas, after leaving the condensers, is treated at some later period to remove or render innocuous the naphthalene still remaining in it. At one works the experiment has been recently tried, and the results investigated, of only reducing the gas in the condensers to 80° to 95°, instead of 55° as formerly. The process of injecting a mist of paraffin oil into the gas as it goes to the district is in use for the whole supply in two works; and since its introduction all the trouble with naphthalene on the district has ceased. In two other works, the process is at work on one of the districts supplied, and is "completely successful" at one and "very fairly successful" at the other. A process for vapourizing creosote oil or paraffin oil into purified gas—thus bringing about the formation of a solvent fog, which abstracts the naphthalene from the gas—has been successfully tried at two works.

From the information afforded by the returns, it appears, therefore, that methods are known and in practical use for the treatment of the gas subsequent to condensation in such a manner as to prevent, or greatly minimize, the stoppages caused by naphthalene in the district. But while such processes are of great value under existing circumstances, it would be preferable to prevent its formation, or remove it at an earlier stage of the process of manufacture. That such an object can be obtained is evident from the fact that some works in which the coals carbonized consist entirely of those forming most naphthalene, and where a high yield is obtained, are nevertheless quite free from trouble in works or district, and have never at any time been so troubled.

It seems, therefore, that the next step should be to select two or three typical works—(*a*) troubled with naphthalene, and (*b*) not troubled with naphthalene—where a thorough chemical investigation could be made of the naphthalene present at each stage of the manufacture; and your Committee therefore propose to carry this into effect.

The PRESIDENT said the members had heard the *résumé* of Dr. Colman's report, which had not been given *in extenso* for the reason stated by Mr. Helps. But they would agree with him that it was most interesting, so far as it went; and it was proposed to carry it considerably farther. It was not intended to discuss the subject at this meeting; but should any member desire to ask any questions of the Naphthalene Sub-Committee, they were prepared, if possible, to answer them. What they wished now was the formal sanction of the members to the course proposed to be adopted.

Mr. T. MAY (Richmond) asked whether it was proposed that Dr. Colman should carry on the experiments as indicated by the Hon. Secretary. He was sure that they all had great confidence in Dr. Colman.

The PRESIDENT replied that it was the intention of the Sub-Committee to entrust the work to Dr. Colman, than whom no one was better fitted for the investigation.

The HON. SECRETARY suggested that it might be well for someone to propose a resolution formally approving of the action of the Committee and of the report now submitted. This would place the matter on a proper footing, and would assure the Committee of their power to proceed with the investigation. The expenses were not taken from the funds of the Association, but from funds specially raised. They had, as he believed the Committee had told the members before, promises to the extent of some £500; and this money, more or less, they intended to expend to get as near as they could to the bedrock of this question. The Committee wanted the members to approve of their action so far, and, by the approval of the report, to show they wished them to carry the matter as far as they possibly could.

Mr. S. W. DURKIN (Southampton) said he had much pleasure in proposing a resolution in the terms set forth by the Hon. Secretary, in order that the investigation might be continued.

Mr. J. L. CHAPMAN (Harrow) seconded the motion, which was unanimously agreed to.

This concluded the business; and, according to custom after the annual meeting, the members subsequently dined together.

The necessity for carefully covering submerged pipes is shown by an accident described in the report of the Cambridge (Mass.) Water Board for the year ending Nov. 30 last. A schooner grounded while coming through the draw at the Third Street bridge, and as the tide went out it settled on a 12-inch water-pipe and broke it.

We have received from Messrs. Butterworth and Co., of Bell Yard, Temple Bar, "The Law Relating to Electric Lighting, Traction, and Power," by Mr. J. Shiress Will, K.C. It is the third edition of the author's well-known work, first published in 1898, dealing with the law relating to electric lighting only; but, as will be noticed from the title, its scope has been extended so as to embrace traction and power. We shall deal more fully with the book in a subsequent issue.

GERMAN PROGRESS IN THE RECOVERY OF CYANOGEN.

(*Continued from p.* 701.)

The conclusions at which Herr Feld has arrived as to the more important fundamental conditions for the recovery of cyanogen from coal gas having been briefly summarized last week (*ante*, p. 701), it will be convenient at this stage to give some particulars of the claims which he has made in the specification of his English patent No. 26,396 of 1901, to which atttention has already been directed.

He makes, under this patent, which was applied for on the 24th of December, 1901, eleven claims for "Improvements in, and relating to, the Recovery of Hydrocyanic Acid from Gases." His specification opens with the statement that the recovery of cyanogen compounds from illuminating gas (*i.e.*, coal gas), blast-furnace gas, coke-oven gas, &c., has hitherto generally been effected in accordance with the method protected under the German patent No. 41,930, which is that of Knublauch already referred to in this communication. The disadvantages of this method are that the soluble and insoluble ferrocyanides obtained are laden with sulphur and other impurities derived from the gas, and can only be converted into alkaline cyanides after preliminary purification by a melting process which involves more or less of cyanogen. In order to avoid these disadvantages, Herr Feld states that he extracts the cyanogen from, for instance, coal gas, by an absorption method by which the impurities in the gas are either first removed, or left unabsorbed; while the cyanogen is obtained in a form which yields pure hydrocyanic acid by simple distillation.

Observations have shown that certain cyanogen compounds, when in solution, will yield the whole of their cyanogen as hydrocyanic acid when simply heated to (say) the boiling point; while others only do so when suitably treated with acid. For instance, a solution of the cyanide of an alkali or alkaline earth, if heated with a solution of a compound of magnesium, aluminium, lead, zinc, or manganese, evolves the whole of its cyanogen as hydrocyanic acid entirely free from other gases. The reaction is (taking, for instance, solutions of potassium cyanide and magnesium chloride) as follows:—

$$2\,KCN + MgCl_2 + 2\,H_2O = 2\,KCl + Mg(OH)_2 + 2\,HCN.$$

On the other hand, a basic compound, or a carbonate of either of the five metals named, if in solution or suspension, is converted in the cold into the corresponding cyanide when brought in contact with gas containing free hydrocyanic acid or ammonium cyanide. The reactions (taking, for example, magnesium hydroxide as the basic compound) are as follows:—

$$Mg(OH)_2 + 2\,HCN = Mg(CN)_2 + 2\,H_2O$$

or

$$Mg(OH)_2 + 2\,NH_4CN = Mg(CN)_2 + 2\,NH_3 + 2H_2O.$$

These basic compounds or carbonates, in solution or suspension, thus afford a means of extracting in the cold hydrocyanic acid from gas; while the pure acid can be subsequently obtained by heating the solution or liquid to the boiling point. Broadly, these basic compounds—such as the hydroxides, or the neutral or basic carbonates of magnesium, aluminium, lead, zinc, and manganese—constitute a group distinguished by the fact that, when dissolved or suspended in cold water or a saline solution, they form the corresponding cyanides with any hydrocyanic acid in gas treated with them, while these cyanides are decomposed by heating or boiling the solution. These compounds may be further classified in four subsidiary sections—viz.: (*a*) The basic magnesium compounds, which absorb also carbonic acid, but not sulphuretted hydrogen; (*b*) the basic aluminium compounds and magnesium carbonate, which absorb only the hydrocyanic acid, and no appreciable quantity of either sulphuretted hydrogen or carbonic acid; (*c*) the basic zinc, manganese, and lead compounds, which absorb sulphuretted hydrogen as well as hydrocyanic acid, but no appreciable amount of carbonic acid; and (*d*) the basic or neutral compounds of manganese and zinc, and all compounds of lead which take up sulphuretted hydrogen as well as hydrocyanic acid in the cold, but liberate the hydrocyanic acid when either saturated with sulphuretted hydrogen or sufficiently heated.

A second main group comprises the compounds of copper, mercury, and iron, which absorb hydrocyanic acid, when either cold or hot, if in solution or suspension in a basic or neutral condition, and when cold only if in an acid condition; while the hydrocyanic acid is only completely disengaged when the liquid is boiled with an acid. With regard to the iron compounds, they must be wholly in either the ferrous or ferric state, because if mixed prussian blue is formed. The compounds of this group absorb sulphuretted hydrogen, but not carbonic acid, and absorption of hydrocyanic acid does not occur if the liquid containing the compounds is hot and acid. A third and last group comprises ferric and ferrous compounds, either separately or mixed, which, when hot, will not absorb hydrocyanic acid, even in a basic liquid, and in the presence of a salt of the first group. Sulphuretted hydrogen is decomposed by this group.

Following the scheme outlined in this classification, Herr Feld proceeds to prescribe the treatment of gases for the recovery of hydrocyanic acid, according to the constituents of the gases. If the gases contain (A) neither carbonic acid nor sulphuretted hydrogen, they may be washed either (1) with cold liquid, containing the hydroxide, carbonate or a basic salt of any metal in the first group, and the hydrocyanic acid extracted is afterwards disengaged as such by simple boiling, or (2) with a liquid containing any compounds of the second group, from which liquid the hydrocyanic acid is afterwards liberated by boiling with the addition of acid. But if the gases contain (B) carbonic acid as well as hydrocyanic acid, they may be treated (1) by passage through a hot solution containing magnesium hydroxide in suspension, which absorbs the carbonic acid, and allows the hydrocyanic acid to pass on for subsequent absorption according to the methods named under [A (1)] or [A (2)], or (2) by passage through alkali, an alkaline earth or magnesium hydroxide in the cold, whereby both the carbonic acid and the hydrocyanic acid are taken up; and the latter may be subsequently recovered by distillation with solution of a salt of one of the metals included in Group I. (*supra*), or (3) by passage through cold liquid containing magnesium carbonate, or a hydrate or basic compound of one of the other bodies included under Group I., whereby only the hydrocyanic acid is absorbed, and may be subsequently recovered by boiling the solution, or (4) by passage through basic or neutral (cold or hot) or cold acid solutions of the compounds named under Group II. (*supra*), whereby the hydrocyanic acid, but not the carbonic acid, is absorbed, and the former may be subsequently recovered by boiling the solution, after the addition of an acid—*vide*, [A (2)].

In the third case (C), in which the gases contain sulphuretted hydrogen, the process consists in: (1) Washing the gas in the cold with a basic compound classed under the first group, sections *a* and *b*, whereby the hydrocyanic acid is absorbed without the sulphuretted hydrogen; or (2) absorbing both the hydrocyanic acid and the sulphuretted hydrogen in the cold by liquids containing one of the basic compounds comprised under Group 1, *c*, or one of the basic or neutral compounds comprised under the second group, and subsequently liberating the hydrocyanic acid from the solution by boiling only in the first case, or by boiling with an acid in the second case; or (3) washing the gas with hot liquid containing any basic or neutral salt named under section *c* of the first group, or a salt of the second group acidified, or a basic salt of the third group, whereby the sulphuretted hydrogen is absorbed while the hydrocyanic acid passes on and is extracted and recovered by the methods described under [A (1)] or [A (2)]; or (4) washing the gas with liquid containing one of the compounds enumerated under section *d* of the first group, which absorb both sulphuretted hydrogen and hydrocyanic acid in the cold, and subsequently expelling the hydrocyanic acid by boiling, or the action of excess of sulphuretted hydrogen. The action of such an excess of sulphuretted hydrogen may in practice be utilized by the employment of several washers in series for concentrating the hydrocyanic acid in the solution in the last washer. When basic manganese, ferrous, or ferric salts are used for absorbing sulphuretted hydrogen, they may be recovered as such by blowing air through the liquid containing the sulphide in suspension, after the hydrocyanic acid has escaped. Zinc, lead, and other manganese salts, as specified under section (*d*) of the first group, may similarly be recovered by air-blowing until the amount of sulphur deposited in the material becomes worth extraction.

The fourth and last case (D) is that of gas containing both sulphuretted hydrogen and carbonic acid, as well as hydrocyanic acid. The procedure in this case is to absorb the carbonic acid alone, or along with the hydrocyanic acid, or to absorb only the hydrocyanic acid, following one or other of the methods described under B (1) and B (3), and subsequently treating the gas by methods included under C (1) to (3). Lastly, the hydrocyanic acid in purified gas or liberated from pure cyanide solution, may be absorbed directly by alkalies or alkaline earths, and by this course of procedure further distillation becomes unnecessary, provided no impurities pass from the gas into the absorbent. In the last-named contingency, the alkaline cyanide has to be distilled with one of the compounds enumerated under Group I.

Herr Feld proceeds to set forth his claims, after a substantial statement of the behaviour of the various groups of compounds towards hydrocyanic acid, of which statement we have now presented a digest. His first two claims relate to the recovery of hydrocyanic acid from gas containing it, either free or as ammonium cyanide; the next four claims relate to its recovery from gas in which carbonic acid is also present; the next four claims relate to the treatment when sulphuretted hydrogen, but no carbonic acid, is present; and the eleventh (and last) claim is for a process for its recovery when the gas contains also both carbonic acid and sulphuretted hydrogen. These claims may be briefly indicated by reference to the foregoing classification of the various absorbents of hydrocyanic acid. In all cases where hydrocyanic acid is spoken of, either the free acid or the ammonium salt is implied.

The first claim is for the treatment as described under A (1) (*supra*), with the addendum that mixtures of the salts named with oxides, hydroxides, or carbonates of the alkalies or alkaline earths may also be used for treating the gas. The second claim is for absorption by an oxide, hydroxide, or carbonate of an alkali or alkaline earth, and subsequent expulsion of the hydrocyanic acid by heating with a compound of the first group. The

third claim is for the treatment described under B (1). The fourth is for B (2); the fifth for B (3), and the sixth for B (4). The seventh claim is for the treatment indicated under C (1); the eighth claim is for B (2) so far as it relates to the basic compounds of Group I, C, only. The ninth claim is substantially for the procedures described under C (3); the tenth claim is for C (4), with the limitations that only basic compounds of zinc, manganese, and lead are claimed for use as absorbents, and only the use of excess of sulphuretted hydrogen is claimed for the expulsion of the hydrocyanic acid. The eleventh and last claim, relating to obtaining hydrocyanic acid from gases containing also both sulphuretted hydrogen and carbonic acid, is for the separation of the hydrocyanic acid from the sulphuretted hydrogen according to either claim 8, 9, or 10, for the separation of hydrocyanic acid from carbonic acid according to either claim 3, 4, 5, or 6, and for the absorption of hydrocyanic acid only according to claim 7.

It will be seen that Herr Feld's claims are very comprehensive; and by a course of elimination, it may be ascertained that he has omitted to claim very few of the possible courses of procedure which he included in his classification of means of absorption and recovery. It may therefore be surmised that he considered, when he drafted his specification, that but few of the possible methods of cyanogen recovery had hitherto been adopted. Merely noting in passing that he does not attempt to claim any mode of recovery which involves the intentional formation of sulphocyanides, it will be convenient to pass on to a consideration of the progress made by other German inventors, and to return later to a discussion of Herr Feld's processes. All interested in cyanogen recovery, however, owe a word of thanks to Herr Feld for his lucid and comprehensive summary of the action of various compounds towards hydrocyanic acid, with and without admixture of sulphuretted hydrogen and carbonic acid.

(To be continued.)

HIGH-PRESSURE GAS DISTRIBUTION FROM A CENTRAL WORKS TO STORAGE STATIONS.

The following particulars of an interesting application of high-pressure trunk-mains for facilitating the supply of gas to scattered communities in Switzerland are taken from a communication by Dr. E. Schilling, of Munich, to a recent number of the "Journal für Gasbeleuchtung."

The supply of gas from one centre to several places some distance apart is becoming more and more general in Switzerland. The firm which successfully solved the task of doing this in some of these cases has recently erected a central station at St. Margrethen, in the Rheintal, for the purpose of supplying gas to several small towns in the district. The high-pressure mains extend in two directions from St. Margrethen—south-westerly, touching Au, Berneck, Balgach and Rebstein, and to be continued later to Altstätten; and north-westward, to supply Rheineck, Thal, Staad, and, later on, Rohrschach. A third branch towards the east has been planned, to pass over the Rhine, and connect with the Austrian towns of Höchst, Lustenau, and perhaps Dornbirn. At present, seven of these communities are supplied with gas; and it is hoped that others will soon be included, so that in all about fourteen places, with a population of 40,000, will shortly be supplied from St. Margrethen. The mountainous character of the Swiss towns is in many cases a favourable factor in erecting these central stations. For example, in Affoltern a central station has been erected, which can supply ten parishes with a difference in sea level of 650 feet. A gas supply for Davos from a works in the valley below has recently been planned. This project is noteworthy for hygienic considerations, as it will have in view the absolute prevention of smoke and soot.

The Swiss gas-works have, it is claimed, acted as pioneers in the matter of the use of gas for cooking purposes, and with great success. They are aided in this by the flourishing industries of the country, and the absence of native coal. The gas-works at St. Imier, one of the chief seats of the watch trade, is restricted by contract to the sale of gas for cooking purposes; and last year it increased its number of consumers from 265 to 650, and the consumption of gas was evenly distributed over the whole of the months. The ideal of uniform consumption is to be sought in an extensive use of gas for cooking during the day time, and a relatively small consumption for lighting. This is the case in the Rheintal, where a gasholder storage of 25 per cent. of the largest day's consumption is found to be sufficient; while in Germany 70 per cent., or at least 50 per cent., is allowed.

The system of supply chosen was not that in use in some parts of America, where a pressure of upwards of seven atmospheres is adopted, and no gasholders are employed. The erection of holder stations appeared to be more advantageous in Switzerland. As defects of the American system, there may be mentioned: The unnecessary work of compression, the lack of storage holders, the consequent necessity on days of greatest consumption of being able to send about 15 per cent. of the quantity per hour through the mains, and, lastly, the risk of interruptions in working. At St. Margrethen, however, by using gasholder stations, the quantity required for the day can be equally distributed over the twenty-four hours, so that only about 4·2 per cent. per hour has to be passed through the mains. The high-pressure mains are, with a relatively low pressure, of comparatively small dimensions; the holders also are not large. The latter can be uniformly filled in twenty-four hours, and are perfectly trustworthy in working.

The works at St. Margrethen are so arranged that at the central station a three-lift telescopic holder, of a capacity of 105,900 cubic feet, gives a pressure of 11 inches, which, when necessary, can be raised, by means of Roots' blowers, to some 236 inches water pressure. The holder stations are at Au, Rebstein, and Rheineck. The high-pressure pipes which lead to the holders are, in one case, 5 to 6 inches in diameter; while the principal extension is 4 inches diameter. At ordinary pressures, and without holder stations, a main 22 inches diameter would have to be provided. The holders at Au and Rheineck are of a capacity of 17,650 cubic feet each; the one at Rebstein holds 28,240 cubic feet. Adjoining each holder is a house containing a self-acting pressure governor, a spirit evaporator, and a heating boiler for the holder. By means of valves, the inflow to the holders is so throttled that all the holders can be filled at the same time. A valve inside the holder shuts off the inflow as soon as the holder is nearly full. The distributing mains convey the gas from the governors at ordinary pressure to the various places of consumption. The high-pressure mains consist of cast-iron pipes with the usual lead joints. Special attention has been given to the joints; and all the sections have been tested for soundness, by means of soapy water, when under two atmospheres pressure.

The gas-works at St. Margrethen are equipped with all the appliances of a modern gas-works. Their capacity is 176½ million cubic feet per annum. The impression obtained from an inspection of the works is that the example might, in many cases, be followed in Germany. The supply of several small communities—for which, at present, acetylene, air gas, &c., are competing—could be solved in this way in a rational manner. It would be necessary to obtain the services of an engineer, having an accurate knowledge of the local conditions, and competent to turn them to the best advantage.

PHOTOMETRIC TESTS OF INCANDESCENT MANTLES.

A series of photometric tests of incandescent mantles formed the subject of a short communication by Mr. R. C. Cornish to the recent annual meeting of the Wisconsin Gas Association. He carried out the tests in accordance with the principles laid down by Messrs. Russell and White in a paper read by the former gentleman at the meeting of the Michigan Gas Association two years ago. They were these: Use a constant pressure of 20-10ths at the burner, and keep the air constant, varying the gas supply to obtain maximum illumination. Mr. Cornish selected twelve mantles, and three of each kind were tested; but in some cases the average of only two was taken, due to breakage. They were tested without chimney, and with 6-inch and 8-inch chimneys. The burner used was a large tube one having a needle valve for regulating the gas supply. The photometer employed was a 250 mm. bar, with sight-box pivoted so that it could be reversed, and having a wet meter for measuring the gas consumed. The pressure was regulated with a Connelly governor. The Edgerton standard was used, and it was checked each time, before and after making a series of tests, with a Hefner lamp which had been previously tested with candles. He had intended to make calorific tests of the gas at the same time as the photometric tests, but did not have an opportunity. However, he is satisfied the gas was fairly uniform throughout the period of the tests, as the gas-engine operating the lighting dynamo gave uniform results. During this time, the illuminating power of a 5-feet argand burner was 17 candles, and the specific gravity of the gas was ·43.

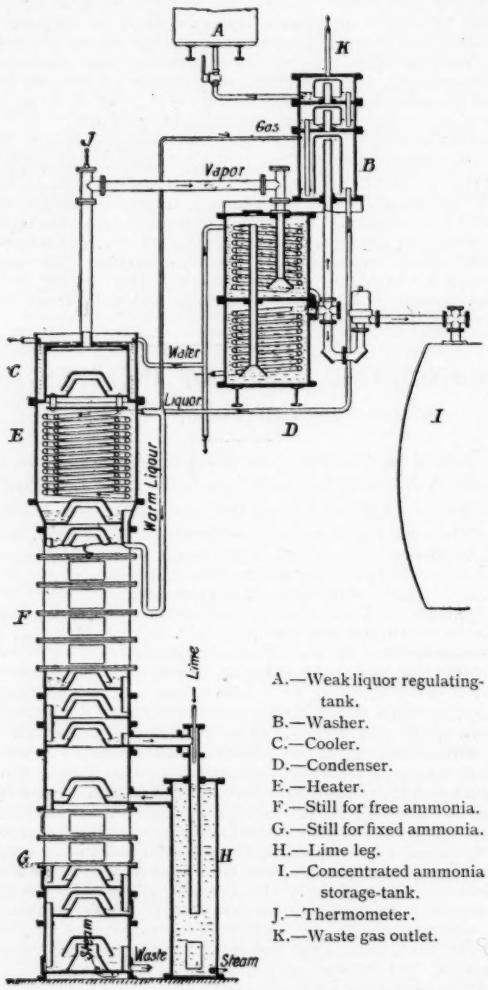
Mr. Cornish gives his results in the form of a table, expressing the names of the mantles by figures. There is an average increase of 45 per cent. in candle power per cubic foot of gas when using a 6-inch chimney over no chimney, and 8·7 per cent. with an 8-inch chimney over a 6-inch one. Nos. 4, 8, 9, and 10 gave best results, while No. 3 gave good results with chimneys, and is a good average mantle.

No.	Without Chimney.			6-Inch Chimney.			8-Inch Chimney.		
	C. P.	Gas.	C. P. per C. Ft.	C. P.	Gas.	C. P. per C. Ft.	C. P.	Gas.	C. P. per C. Ft.
1	40·4	3·68	11·03	58·2	4·16	12·90	66·3	4·43	14·95
2	34·6	3·95	8·74	49·7	4·75	10·45	61·9	4·87	12·73
3	33·3	3·48	9·60	63·8	3·83	16·70	72·8	4·36	16·80
4	47·2	3·42	13·72	69·1	4·05	17·32	82 5	4·45	18·80
5	28·9	3·78	7·64	45·0	4·33	10·65	55·52	4·80	11·56
6	38·0	3·62	10·50	50·8	3·78	13·67	61·8	4·08	15·23
7	45·1	3·59	12·55	66·4	4·03	16·58	77 6	4·44	17·20
8	43·6	3·65	12·00	71·9	4·73	14·88	87·2	4·97	17·28
9	47·2	3·55	13·30	75·5	3·86	19·50	84·6	4·32	19·63
10	51·2	3·65	14·15	77·8	4·08	19·40	89·6	4·43	20·40
11	36·4	3·75	9·70	47·6	4·21	11·30	56·8	4·65	12·30
12	34·5	3·76	9·16	48·4	4·19	11·63	65·1	4·88	13·35

AMMONIA CONCENTRATION IN GAS-WORKS.

At the recent meeting of the Wisconsin Gas Association, Mr. JOHN S. UNGER, of Milwaukee, exhibited a diagram and gave a description of an ammonia concentrator. The author explained that for very small works it could be simplified by leaving out the lower part of the still, whenever the return from the fixed ammonia became so small as not to warrant the extra trouble and expense. Describing the apparatus, he said:

Modern stills are all heated by steam led directly into the liquor, and they consist of cast-iron cylindrical compartments provided with conical openings in the bottom. Over each opening there is a cast-iron hood with serrated edge, and each compartment has a separate channel for directing the liquor on its course downward. Steam enters at the bottom of the still, and first comes in contact with liquor from which the free ammonia has already been driven out in the upper part of the still, and which has been mixed with lime water, in order to drive out the



A.—Weak liquor regulating-tank.
B.—Washer.
C.—Cooler.
D.—Condenser.
E.—Heater.
F.—Still for free ammonia.
G.—Still for fixed ammonia.
H.—Lime leg.
I.—Concentrated ammonia storage-tank.
J.—Thermometer.
K.—Waste gas outlet.

fixed ammonia in the lower part of the still. The lime water may be injected into the still by steam-injectors; but an objection to this method is that a good deal of unnecessary cold water must be fed in with the lime in order that the injectors may work properly. The principle of the lime leg is to provide some additional mixing space for the water and liquor, and also to have a space for the heavy matters in the lime to settle rather than to stop up the still.

The vapours next entering the upper part of the still liberate the free ammonia, and then enter the heater, where they are cooled, and the weak liquors in the lead coils heated, forming a very necessary and efficient part of the apparatus. The vapours are further cooled with water surrounding the top of the still in the cooler, until a certain temperature is reached, which will correspond to the desired strength of the finished product. In the process of cooling, water vapours will condense at the temperature at which they have comparatively little ability to retain the ammonia; so the effect of the cooling becomes a drying of the vapours—a process which has a certain relation to the amount of cooling effected. The temperature at the top of the still will therefore be a gauge as to the amount of ammonia in the vapours; and it will form the chief guide for directing the strength of ammonia in the finished product.

From the still the vapours enter the condenser (also called the absorber), where they are cooled to a temperature nearly the same as that of the entering water. The condenser shown is made in two compartments; the vapours thereby being gradually cooled off, so that no sudden cooling will precipitate the ammonia salts. The cooling water enters the lead coil from below. The concentrated ammoniacal liquor overflows from the lower compartment of the condenser into a cross, then through a seal pipe up into an overflow pot, covered with a glass jar for ready observation and the taking of samples, and next into a storage tank. This tank can readily be placed sufficiently high that tank cars can be loaded from it by gravity.

There are some gases liberated from the liquor which do not condense; and as these may be the cause of some loss of ammonia, a small washer is placed above the condenser, through which the weak liquor passes on its way to the still. A regulating-tank should be fixed above the washer, so that the weak liquor may have a constant head, and thereby a uniform flow be secured. This can be done by slow pumping, keeping the tank always full, and allowing the surplus liquor to overflow back to the well.

The washer also takes care of the gases that will escape from the weak liquor in the coils of the heater, when the liquor is heated to a temperature of from 160° to 180°. A dissociation of the ammonium carbonates will then occur, and carbonic acid be liberated, while at that temperature the water has still sufficient ability to retain its percentage of ammonia. In this way, very little ammonia will escape with the carbonic acid and other gases, and whatever does escape is taken up again by the liquor in the washer. By this means, a considerable quantity of carbonic acid may be eliminated from the liquor before it enters the still, which is very important, if it is desired to concentrate the liquor above 18 per cent.—the ammonium carbonate being the cause of salting in the condenser and storage tank.

The waste liquor leaves at the bottom of the still through a seal of sufficient depth to overcome the pressure in the still. The waste is thereby made perfectly automatic, and requires no attention. The bottom compartment of the still should be provided with a pressure-gauge, conveniently made up of a glass U-pipe filled with mercury. A glass water-gauge should also be placed here, and one in the bottom compartment of the upper still. The steam should have a uniform pressure, and it is well to place a pressure-regulating valve in the steam-pipe.

The operator should watch his pressure-gauge, observe the temperature at the top of the still, and regulate the admission of steam and the flow of the liquor, so that the pressure and temperature may be kept uniform; and at the same time the waste should be practically free from ammonia. The lime-mixer will require some occasional attention; but with everything working uniformly, a man's whole time will not be needed. The apparatus can be left idle over night; but in order to save heat, it may be well to let some of the waste exhaust steam at the gas-works keep it warm over night.

In selecting materials for the apparatus, it must be remembered that the warm vapours in the upper parts of the still have a very injurious effect on wrought iron, so that this material should be entirely omitted in the interior of the heater, cooler, and condenser; the coils should be made of lead, and any other parts coming in contact with the vapours should be of cast iron.

As to the amount of steam required for each pound of ammonia in the liquor, it will vary with the size of the still and the percentage of ammonia in the weak liquor. A test with a 40-inch diameter still showed 21 lbs. of steam per pound of ammonia. A 36-inch still at a gas-works in Wisconsin used 4 tons of breeze during a 48-hours run, making about 1000 lbs. of ammonia. At the same time and place, 700 lbs. of burned lime was used to liberate the fixed ammonia.

Welsbach Rumours.—The daily papers were busy last week making unauthorized statements regarding the Welsbach Company; and whether there is any truth in them, we are at present unable to say. The "Daily Mail" led the way with the following paragraph: "We are able to make a very interesting statement in the matter of the Welsbach Company. An agreement has been signed with another group, whereby certain processes are acquired which will, it is thought, materially improve the mantles manufactured by the Company, and may result in economies in working. The agreement, negotiations in connection with which have been pending for some time, has just been concluded. In regard to the financial reorganization scheme, we are also in a position to state that nothing will be announced until the report is issued to the shareholders in a few weeks' time, and they are able to judge of the working results of the past year. It is said, however, that the scheme is practically arranged." Following this, the financial papers made some supplementary statements. A writer in the "Financier" said: "I am in a position to give further particulars of the arrangement which, as a daily contemporary announces, has been arrived at between the Welsbach Company and one of its most formidable rivals. The concern referred to is a Syndicate with a capital of £15,000, owning what is known as the 'Plaissetty' mantle. For this it is claimed that it is harder and better than other mantles, and can be sold at about a third of the cost of the standard Welsbach type. The Corporation of Paris, in concluding an agreement with the Welsbach Company, is said to have insisted on Plaissetty mantles being installed."

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

Blue Water Gas at Ilford—and Elsewhere.

SIR,—Considering the "JOURNAL's" "Notable Experiences with Blue Water Gas at Ilford," and our past journalistic relations, I expected your denunciation of my "denunciations" when my original statement was published. It seems scarcely so apt as a sequel to: "We heartily welcome the full, lucid, and peculiarly interesting contribution that Mr. A. G. Glasgow has made to our columns. . . . It is in the interests of truth and knowledge that those whose statements and acts he calls in question should meet his charge fully, candidly, and in a like bold spirit." Possibly this change of front is due to the disappointing character of the replies, which leave my "charge" unrefuted.

I have previously experienced your criticism of my words, when facts were stubborn; but, in the present instance, you would apparently place phrases first, and facts nowhere. You object to calling "a spade a spade," "whether it is justified or not." Surely, if it be "*justified*," that settles the matter; and, in my code, the practices I have described not only justify but demand (and will always receive) plain, unvarnished, and unmistakable language. I, on the other hand, object to calling a spade a spade, if (save the bull) it be not a spade; but you scarcely seem to share this objection. You would call a pecuniary discrepancy of 115 per cent.—*i.e.*, between 3·48d. and 7·5d.—a difference in "views." I doubt if this explanation would be held to justify such a deficit in the cash-till.

I think you also misapprehend the nature of my statement, when you characterize it as "impassioned." On the contrary, this statement is the carefully considered result of a cumulative experience extending over some five years, during which time repeated efforts have been made to stop Continental misrepresentations by the Dellwik promoters, as particularized in my statement. When these practices were finally imported into England, Mr. Humphreys and I judged that stern measures were necessary; and, far from finding anything to qualify in my communications, I am rather disposed to question if I have fully discharged our responsibilities in the circumstances.

Already 3½d. per 1000 cubic feet is becoming generally accepted as the cost of blue water gas; and I notice that the current issue of the "Builder" bases emphatic conclusions upon the statement "plain water gas costs only 3½d. or less"—perhaps drawn, with hasty confidence, from your columns.

But however that may be, I have accomplished my purpose, and shall make no further demands upon your space. I shall redeem my promise to "Califaccion" when he addresses me privately, over his own signature; but your "several gas engineers" need no longer hesitate, on my account, to work their will in your columns.

38, *Victoria Street, S.W., March* 21, 1903. A. G. GLASGOW.

SIR,—Mr. Glasgow has again favoured us with a further article on the above subject, which once more unfortunately misses the chief point. There cannot be any value in endeavouring to arrive at costs until the possibility of the same work being performed on two different machines has been proved.

In Mr. Glasgow's original article (see "JOURNAL" for Feb. 10, p. 351) the crux of the matter, I take it, lies in the words: "I do not think I need go into further detail when I unqualifiedly deny . . . the assertion which attributes comparative inferiority to the technical working of the standard Lowe generator."

Now the distinctive claim for the other system has been a certain make of blue gas per ton of coke; and, therefore, I would ask Mr. Glasgow, Can he do the same with the Lowe generator? When this has been proved, I think it will be time to go into the matter of the relative cost for the similar work done.

With regard to Mr. Glasgow's wish to have the run of a coke heap and plant for demonstration purposes, this I do not think is in order. It is essentially a preliminary to the claim above mentioned, of equality of the respective plants; and once more I would call for the figures which Mr. Glasgow must have had before him when he denied the comparative inferiority.

As to the experience of fifteen years ago, of "fuel" gas in the United States, this is beside the immediate point, and moreover "much water has flowed under the bridge since then."

March 19, 1903. CALIFACCION.

SIR,—With reference to the discussion which has been waged round Mr. Glasgow's attack on blue water gas, perhaps my results with the Lewes process of admitting blue water gas through the retorts may be of interest.

To begin with the question of cost. Our cost for blue water gas into the holder works out as follows:—

Labour	0·68d.
Coke for generator	2·20
Fuel for boiler	0·39
	3·27d.

The plant has a capacity of 300,000 cubic feet per 24 hours, but is worked during the day shift only, and not every day.

Dealing with the cost of labour, a water gas maker is employed at 4s. per day, and a boy at 10s. per week. Coke is charged at 11s. per ton (the average value here), and our average make per ton of coke to date is just 60,000 cubic feet. This figure would be much higher, of course, were we able to work the plant regularly, as there is naturally a waste of coke while the generator is standing.

The extra cost of benzol required to carburet the mixed gas is equal to 3·94d. per 1000 cubic feet; thus making a total cost for the water gas, *plus* enrichment, of 7·21d. per 1000 cubic feet.

To these figures should be added, according to Mr. Glasgow, purification, wear and tear (including a proportion on the whole of the works), proportionate expense of exhausting and share of management, office, yard, and incidental expenses. My purification charges last year worked out to 0·96d. per 1000 cubic feet. As we shall probably average 20 per cent. of water gas, a fifth of this will, I take it, satisfy Mr. Glasgow as the share for the water gas, although considering the preponderance of impurities in coal gas as compared with water gas, it is unfair to the latter. This will give purification 0·19d.

I have not had the plant long enough to say what the cost of wear and tear is going to be; but judging by its condition up to date, the item will not be a large one. Repairs and maintenance on the works last year cost us 2·35d. per 1000 cubic feet. A fifth of this will equal 0·47d. A fifth part of the exhausting charges would equal 0·04d., and of management, office, &c., 0·93d. Therefore, in addition to the cost of water gas, *plus* enrichment, which I have given, we may add—

Purification	0·19d.	
Wear and tear (say)	0·97	
Exhausting	0·04	
Management, &c.	0·93	— 2·13d.
Cost of water gas, *plus* enrichment		7·21
Total		9·34d.

The cost of our coal gas last year, inc'uding the same charges, worked out at 16·16d.

When going into the question of water gas, we could not satisfy ourselves that we could produce carburetted water gas on the Lowe system any cheaper than, if as cheap as, coal gas, nor do I see reason to alter that opinion to-day. On the other hand, blue water gas could be produced by the Dellwik plant very cheaply; and Professor Lewes's idea of introducing it through the retort, so that it might gather some of its enrichment from the richer hydrocarbons which condense into the tar, and also prevent the cracking up of others, seemed to us a feasible one. We are now thoroughly satisfied with the results obtained from this system; and I have no doubt as to the correctness of Professor Lewes's theory. As our results are somewhat startling, I give the figures, first of a careful working test made by Professor Lewes's assistant (Mr. Hills), and, secondly, of a week's working here. We have gradually improved on our results from the Lewes process, and have now, for nearly a month past, obtained a make per ton of coal gas alone (deducting the water gas added) of over 12,000 cubic feet. Previous to the use of water gas, our make averaged about 11,000 cubic feet per ton. I may say that all coal is weighed into the retort-house, and the water gas admitted to the retorts is measured.

Test by Mr. Hills, Feb. 27, 1903.

Coal carbonized	31·07 tons
Total purified gas made	528,000 cu. ft.
Total crude water gas added	144,000 ,,
Make per ton, deducting water gas	12,359 ,,
Make per ton, including water gas	16,993 ,,
Water gas added	37·5 per cent.
Water gas in mixture	27·2 ,,
Illuminating power (unenriched)	11·13 candles.
Candle-feet per ton	37,826
Calories per cubic foot, gross	130·5
Calories per cubic foot, net	118·8

One Week's Working Results.

Coal carbonized	196 tons
Total purified gas made	2,869,000 cu. ft.
Total water gas added	459,000 ,,
Make per ton, deducting water gas	12,295 ,,
Make per ton, including water gas	14,638 ,,
Water gas added	19·05 per cent.
Water gas in mixture	16·00 ,,
Illuminating power (enriched)	15·40 candles
Gallons of benzol added per 1000 cubic feet (total)	0·081

These results make me thoroughly satisfied with the adoption of blue water gas. The only point on which I can see that Mr. Glasgow scores is with regard to calorific value. There is, of course, bound to be a reduction with the admixture of blue water gas. In our case, when using 37 per cent., we had a reduction in calorific value of 11 per cent. But so far I have not observed any bad effects either with incandescent burners or stoves. The whole of our street lighting is incandescent; and, if anything, the use of water gas seems to brighten the light from these. Gas-fires are, I think, most likely to be affected, seeing that many are anything but perfect; but there has been no trouble with them so far as I am aware. I have a Kern fire (which is as perfect a gas-fire as I think there is) in my house; and this has stood the various percentages of water gas with equanimity.

Mr. Glasgow may call it tricking if he will. But the tendency of the age is towards a lower illuminating power and cheaper gas; and the Lewes process is a step towards this ideal.

Tipton, March 20, 1903. SIDNEY O. STEPHENSON.

SIR,—I do not profess to be a champion of the cause of blue water gas; but, in the interests of the gas industry, I am anxious that accurate figures should be published as to the cost of production at Ilford, and therefore append what I consider a fair estimate, based on the lines laid down by Mr. Glasgow.

Wear and Tear.—Mr. Glasgow's figure (viz., a proportion of the total maintenance, wear and tear, &c.) on the whole works, according to last half-year's balance-sheet at Ilford, amounts to 7·80d. per 1000 cubic feet sold; this abnormally high figure being due to the rebuilding of regenerators, and to converting the whole of No. 2 retort-house from direct fires to regenerative furnaces. The total cost of wear and tear on the water-gas plant alone for the half year did not amount in all to £5; and an allowance of 0·5d. per 1000 cubic feet should be a very liberal sum under this head.

Management, Office, Yard Expenses.—The production of 500,000 cubic feet of water gas per diem, with one man, in place of ten men with coal-gas plant, and the reduction by almost one-half of the coke sales entered through the books, or loaded out of the yard, most gas managers will agree ought to reduce office and yard expenses.

Extra Cost of Making Test.—This was certainly 0·3d. per 1000 cubic feet more than average working; and therefore the total cost of manufacturing blue water gas at Ilford is as under, viz.:—

	Pence per 1000 Cubic Feet.
Labour, coke, water, oil, as per test, *plus* 20 per cent. as per Mr. Glasgow's suggestion	4·00
Boiler fuel	0·25
Purification (one-fourth of 0·62d.)	0·16
Wear and tear	0·50
Proportion of exhausting expenses	0·50
Management, yard expenses	*nil*
	5·41
Less extra cost of making test	0·30
	5·11

These I consider "the true facts of the case," and with "the net cost of coal gas not less than 2s. 2d. per 1000 cubic feet at Ilford," and the results obtained by its use, there is an undeniably strong case for blue water gas at Ilford. To allay Mr. Glasgow's surprise as to "the net cost of coal gas at Ilford," I append an instructive comparison.

—	Per 1000 Cubic Feet of Gas Sold.			
	Gas-light and Coke Company.	Ilford Gas Company.	West Ham Gas Company.	Tottenham and Edmonton Gas Company.
	s. d.	s. d.	s. d.	s. d.
Coal and oil	1 3·40	1 7·18	1 6·67	1 3·09
Purification	0 1·12	0 0·62	0 1·60	0 0·72
Salaries	0 0·37	0 0·64	0 0·44	0 0·52
Wages	0 3·31	0 3·21	0 4·58	0 2·30
	1 8·20	1 11·65	2 1·29	1 6·63
Coke and breeze	0 6·03	0 6·77	0 6·42	0 3·67
Tar	0 1·21	0 1·29	0 1·37	0 0·91
Liquor	0 1·59	0 1·04	0 1·64	0 0·67
	0 8·83	0 9·10	0 9·43	0 5·25
Cost of manufacture, less wear and tear, and less residuals	0 11·37	1 2·55	1 3·86	1 1·38

Many circumstances, too numerous to mention, specially favoured the adoption of blue water gas at Ilford. The scheme was considered by the Directors in the light of an experiment; and a very profitable one it has turned out to be. I must admit, however, that I am not at all satisfied that the whole question has been thoroughly thrashed out; and even yet, Mr. Glasgow may some day have the pleasure of competing for the erection of a carburetted water-gas plant on my recommendation.

In order to obtain more exact and conclusive figures (?), I have had prepared a complete testing plant so as to thoroughly investigate the claims of what is known as the "Lewes Process" (as far as Nottingham is concerned). The testing plant is most complete in every detail; and coal can be carbonized on a working scale—viz., in a through bed of six retorts 20 feet long (one of a bench of twelve). The plant has its own exhauster, condensers, washer, purifiers, meter, and holder, &c., with tar and liquor wells specially adapted for measuring same. The tar produced can also be distilled experimentally in a 16-gallon still.

The blue water gas can be passed through a meter into one end of each of the six retorts; and I anticipate that accurate and conclusive results ought to be obtained.

Change of superintendents and temporary absence of the chemist in charge of this plant has compelled me to postpone for a time the carrying out of these experiments. But I should be delighted to welcome Mr. Glasgow (or any other gentleman) to Nottingham to take part in these tests; and he would thus have an excellent opportunity of demonstrating the relative value of the two processes, and of setting at rest once for all this very vexed question.

I am delighted that he considers I have "faced my predicament fairly," but must submit that his reply as to the cost of carburetted water gas under similar circumstances is very evasive. Is he not able to give me the items under each head—viz., coke, oil, labour, water, wear and tear, &c.? Such information would be considered of great value by many engineers interested in the two processes.

Nottingham, March 20, 1903. J. H. Brown.

The Trafford Park Estate and Cheap Power Gas.

Sir,—I note that you have again been led into a wrong statement with regard to the Trafford Park area. If you will refer to your issue of July 29, 1902, you will find a letter from me which states that Trafford Park is in the area of the Stretford Gas Company. In a subsequent letter, I stated that a small portion of the area was supplied by the Salford Corporation; but as practically the whole of the manufacturing portion of the park is in the district of Stretford, the Salford Corporation have no powers to supply either gas or electricity in the area. The other portion—which is largely farming and grass land—is in the township of Davyhulme; and as this district was included in the Stretford Gas Act of 1862 and the Salford Corporation Act of the same year, we both claim the right of supply. Salford, however, have no powers to supply electrical energy in this part.

With regard to the Trafford Park Power and Light Company, I think the "Electrician" has not taken the trouble to ascertain its facts. The electric lighting and power portion of the Park Company's business is, no doubt, flourishing; but the power gas producing plant is doing no business at all—in point of fact, it never has done, and the producers at this day are standing idle.

The Stretford Gas Company are supplying illuminating gas for power and manufacturing purposes to eight of the largest firms within the park area. There seems to be no immediate probability of the Mond gas plant being put to work, as we are at the present moment preparing to fix two additional meters of large size for the Westinghouse works.

The question of cheap gas for power has been agitating the minds of local gas engineers—especially Mr. Meunier, of Stockport—for some considerable time; and although Mr. Tobey may have been the first to "lead off," it is very doubtful if he is the first to conceive the idea. I do not wish to detract from the honour of the Malton Gas Company, but simply to point out that other people have been working in the same direction.

Stretford, March 18, 1903. H. Kendrick.

Trustees and Investments in Debenture Stock.

Sir,—I should like to draw attention to an error which is frequently being made in the drafting of particulars of sale of debenture stock. In the particulars of stock offered for sale by public auction at the Mart within the last few weeks, I find the following paragraph:—

> By the "Debenture Stock Act, 1871" it is provided that, where a power has been given, or shall be given, to trustees to invest trust funds in mortgages or bonds of a company, such power shall include a power to invest such funds in the debenture stock of such company.

The Act quoted was wholly repealed by the Trustee Act, 1893 (56 and 57 Vic., cap. 53). In this later Act will be found a clause somewhat similar to the above in sub-section 2 of section 5.

As the particulars I refer to were issued under the authority not only of secretaries but of solicitors to gas companies, other secretaries may easily be misled, unless their attention is drawn to the mistake; and it is with the hope of effecting this purpose that I ask you to be good enough to find room for this letter in your columns.

Gas Offices, Reading, March 20, 1903. Arthur H. Cane, Secretary.

The Proposed New Gas-Works for Birmingham.—A statutory public meeting of the owners and ratepayers of Erdington was held last month (*ante*, p. 433), to determine whether or not the District Council should be supported in their resolution to oppose the clauses of the Birmingham Corporation (Omnibus) Bill which provide for the erection of gas-works at Bromford. The meeting decided, by a substantial majority, against the expenditure of any public money in opposition to the proposal. A poll was, however, demanded; and this has now been taken. The result was as follows: For the resolution of the Council to oppose the gas-works, 1366; against, 1097—majority in favour of the Council, 269. Only about half the electors voted.

Devonport Corporation and the Water-Works.—A report was presented to the Devonport Corporation on Thursday respecting the progress of the negotiations for the acquisition of the water-works. The Town Clerk (Mr. A. B. Pilling) had been instructed to write to the Water Company, inviting them to state the amount for which they would be willing to dispose of their undertaking to the Corporation, so as to avoid the trouble and expense of arbitration; the negotiations to be without prejudice, and not to be referred to in any subsequent proceedings. Correspondence had also taken place between the Town Clerk and certain of the officers of the Company as to the continuance of their appointments under the Corporation. Three of the officers—the Secretary (Mr. Foster J. Bone), the Engineer (Mr. H. Frances), and Mr. W. Parr—had appointed Mr. Charles Hawksley to be Arbitrator on their behalf to settle the compensation to be paid them for loss of income and office; while Mr. G. H. Hill was appointed Arbitrator on behalf of the Corporation.

Gas Supply in the Colonies.—In the "Journal" last week we gave some particulars in regard to the gas supply of Sydney and its suburbs, as recorded in the course of the proceedings at the half-yearly meeting of the Australian Gaslight Company. We are now in a position to supplement them by others furnished by the reports of the Maryborough (Queensland) and Wellington (New Zealand) Gas Companies. In the former, it is stated that the profit for the half year ending the 31st of December amounted, with the unappropriated balance, to £1065, of which £1027 was available for distribution. The Directors recommended a dividend for the six months at the rate of 6 per cent. per annum, which left £255 to be carried forward. The Wellington Company had a substantial increase in the consumption of gas, and a satisfactory year's working, in 1902, and, as the result, there was a divisible balance of £16,853 at the close. A dividend of 10s. per share on the fully-paid shares and 5s. per share on those partly paid up was declared in July; and the Directors recommended the payment of similar amounts for the rest of the year.

Incandescent Gas Lighting in Kensington.—At the meeting of the Kensington Borough Council last Tuesday, the Works Committee reported that they had had before them a letter from the Gaslight and Coke Company, suggesting the adoption of incandescent gas lighting in all lamps in the borough at present fitted with flat-flame burners, and forwarding draft form of agreement which the Company were prepared to enter into with the Council, whereby the initial cost of the adaptation of the system to 2000 lamps with "Windsor" pattern lanterns, amounting in the aggregate to £4200, would be advanced by the Company to the Council, free of interest, repayable in four to five years, by equal quarterly instalments—the Company to maintain the lamps, mantles, &c., at the rate of £1 8s. 6d. per lamp per annum. As the attention of the Committee had been called to certain difficulties which would arise if the Company's offer were accepted, they recommended that this should not be done; and their suggestion was acted upon without discussion. Subsequently, it was decided that a number of lamps in various streets should be fitted with "Kensington" lanterns and incandescent gas-burners, at an estimated cost of £243.

PARLIAMENTARY INTELLIGENCE.

GLEANINGS FROM THE COMMITTEE ROOMS.

THE Select Committee work on Private Bills was slow in making a substantial commencement this year. The first Committee to sit was from the Lords; and they opened the ball on Thursday—quite three weeks later than last year. Their Lordships have had the whole range of Committee rooms to themselves until to-day, when two Commons Committees start the consideration of the groups of Bills referred to them. But altogether there is apparently no great disposition to hurry things forward; and there is every prospect that the labours of the session in this direction will be passed through in easy stages. So far as the London group of gas measures are concerned, it is stated that they will not be taken until after the Easter recess.

Agreements. On assembling on Thursday, the Lords Committee referred to found a nice slice of luck awaiting them—the non-appearance of parties in no less than four of the Gas Bills which were in the list of measures entrusted to their scrutiny relieving them of their consideration. The first was the Chard Corporation Gas and Electricity Bill, which is to authorize the purchase of the undertaking of the Gas Company, in accordance with the provision made in the Company's Act of last session. The Company had petitioned against the Bill; but the petition was withdrawn, and so the Bill proceeds as an unopposed measure. Then there were the two Nantwich Bills—one by the Gas Company (a limited concern) for incorporation and powers of an ordinary character, and the other by the District Council for compulsory powers of purchase. The Company have withdrawn their Bill and their opposition to that of the District Council; they having practically agreed to the sale of their undertaking on arbitration terms and on the basis of compulsory sale. They are also to receive a certain amount in respect of the costs incurred in the promotion of their own Bill and in opposition to that of the Council. Then the British Gaslight Company are promoting a Bill (practically a Money Bill) for sanction to expend further capital on their Norwich station. The Corporation asked Mr. William A. Valon (Messrs. W. A. Valon and Son) to report to them on the provisions contained in the Bill, with the object of obtaining modifications and amendments in connection with some of the clauses, more especially those relating to capital and the power to control the laying of pipes in private streets. After considering Mr. Valon's report, the representatives of the Corporation and the Company (including Mr. Corbet Woodall) met at a round-table conference at Messrs. Sherwood's office, at which most of the disputed points were agreed to; and a final agreement was arrived at in the course of correspondence between the Agents—Messrs. Sharpe and Co. representing the Corporation. This also has avoided the necessity of bringing the Bill before a Committee. Perhaps the Chairman of the Company (Mr. Horsley Palmer) will have something to say as to the nature of the terms of agreement at the meeting of the shareholders to-morrow. The Ipswich Gas Company's Bill was in the list of Bills set down to come before one of the Commons Committees which commence sitting to day. A strenuous effort, however, was made, both by the Company and the Corporation, to settle their differences without appearing before the Committee; and, as the result of several consultations between the parties, the opposition to the Bill was finally withdrawn yesterday. The Company were advised by Mr. Corbet Woodall, and the Corporation by Mr. William A. Valon; the Parliamentary Agents for the parties being Messrs. Dyson and Co. for the Company, and Messrs. Sharpe and Co. for the Corporation. As will be seen, too, the Gorleston and Southtown Gas Company have escaped conflict with the Corporation by concessions which were not detrimental to their interests. It is also stated that in connection with certain other measures to which opposition has been entered, the parties are on the verge of amicable settlement. The more of this kind of thing—in view of the saving of heavy expense and time—the better, where a peaceful solution of differences can be arrived at without hurt to the interests of promoters.

Plymouth and Stonehouse Gas. The whole of the first day's sitting was consumed in the discussion of the Bill of the Plymouth and Stonehouse Gas Company; but the only opponents were the East Stonehouse District Council. It was altogether a curious position for this little body to be in, seeing that the governing authority of Plymouth itself had not found anything sufficiently objectionable in the measure to call for representation before their lordships. The most, however, was made of the fact that the Corporation reserve their right of appearing in opposition in the Lower House; but if the proposals of the Bill had been considered at all detrimental to the interests of the larger community, the Corporation would have certainly taken the precaution of fighting the measure on the first opportunity. The Company, however, have served the town well; and, with gas at 1s. 9d. per 1000 cubic feet, and proposals in the Bill which will tend to even further reduction, the Corporation cannot fail to have respect for, and confidence in, the management of the undertaking. The intentions of the Bill are simple. The three main objects are to extend the limits of supply to Plymstock, to obtain authority to raise additional capital to the extent of £100,000, with one-third borrowing power, and to reduce the illuminating power of the gas from 15 candles to 14 candles, which is merely a reversion to the standard that existed prior to 1894. Regarding this proposed lowering of the illuminating power, the Company did not—the saving on 1 candle being so small—propose any monetary consideration to the consumers in respect of it, but naturally it will tend to a reduction of price. The petitioners objected to the reduction; or, on the other hand, if it was considered desirable to allow it, then they requested that provision should be made for the supply of suitable burners to the consumers. This was readily conceded by the Company; and a clause was inserted in the Bill requiring them to supply to all consumers not using incandescent burners, at any time within twelve months after the passing of the Act, a sufficient number of burners suitable in all respects for the consumption of gas of the prescribed power. This met the opposition on the one point. As to the other matters, however, the contentions of the petitioners were frivolous. Over-capitalization was alleged; but the price of gas and the actual facts stand as a reproof to this crass ignorance. However, the opponents wanted the proposed new capital reduced. The humorous idea was also advanced that extensions should be paid for out of profits, and not capital. But where the consumers would have come in under such an arrangement, the petitioners omitted to state. Among minor points, objection was also raised to the establishment of a renewal fund, which the District Council failed to see would be advantageous in assisting in the prevention of upward variations in the price of gas. In this connection, Mr. Corbet Woodall (who gave evidence for the Company) supplied the information that he had only found four precedents for a renewal fund; but the proposal merely made the present custom of accumulating a suspense account a legitimate arrangement.

A Discussion on Calorific Power. The only point upon which the District Council can be congratulated (though congratulations cannot compensate them for the expenses incurred) is that their opposition produced some interesting, albeit conflicting, statements on the questions of the supply by the Company of carburetted water gas and the reduction of the calorific power of gas consequent on a lowering of illuminating power. The percentage of carburetted water gas supplied by the Company is about 40; and the petitioners made the amusing propositions that, as it was deleterious to health, its manufacture should be prohibited, or, if allowed, it should only be on condition that there was a reduction in the price charged for it. For the first time in history (if we remember rightly), they asked for provision being made for the testing of the calorific power of the gas, and the imposition of penalties in case of default. This is a big point for East Stonehouse to be the first to raise; and it is one—if necessary—rather for general legislation than for infliction in the case of individual Companies. When an instance arises of an application for a considerable reduction of illuminating power, then will be a reasonable opportunity for asking for an inquiry regarding the loss in the calorific value of the gas; but in a case of a relapse to the extent of only a single candle, there is something rather absurd in the idea. However, now that the matter has been introduced as a subject for argument in the Parliamentay Committee rooms, we may be sure that the last has not been heard of it. The evidence on the subject showed divergent views and experiences. The Chairman of the Company (Mr. J. A. Bellamy) assured their Lordships that a number of tests in Plymouth disclosed the fact that 13-candle gas had the same heating power as 15-candle. In a reduction from 15 to 14 candle power, Mr. Corbet Woodall asserted that the difference in calorific power was so minute as to be not worth considering; and, moreover, notwithstanding the large proportion of carburetted water gas supplied at Plymouth, he stated that the calorific value of the gas was 530 British thermal units, as compared with 550 in the case of the pure coal-gas supply of the South Metropolitan Company. On the other hand, from the books of the West Bromwich Gas Department, Mr. E. H. Stevenson had gathered that, when the proportion of water gas was 12½ per cent., the calorific value of the gas was lowered from 655 to 625 units; and he is of opinion that a minimum calorific power should be prescribed for all gas undertakings. It was clear from his evidence that Mr. Stevenson is not responsible for the suggestion in the petition that the manufacture of water gas should be prohibited. Again, Mr. W. C. Young, one of the Gas Examiners of the Corporation of London, is satisfied that a reduction from 15 to 14 candles in the illuminating power will reduce the heating value by one-fifteenth—or, in round figures, by 10 per cent. In experiments, he has obtained results varying from 8 to 11 per cent.; and his opinion is that a minimum calorific value of 600 units should be prescribed. However, the discussion of the subject produced no result so far as the petitioners were concerned; and with the agreed amendments—the principal one of which is as to the supply of burners—the Bill proceeds.

Hexham Gas. Although the more important Bill from Plymouth was disposed of in one sitting, the learned Counsel engaged on the small measure introduced by the Hexham Gas Company could not succeed in engineering it through in a similar time. The trivial points raised and laboured on the part of the representatives of the Hexham District Council were responsible for this. The whole of Friday was taken up, and a portion of yesterday, with the Bill; and yet, when the detail is sifted out, we have only left the question of the initial price as the real point in dispute. The Company, who are within a few hundred pounds of the end of their capital, asked for power to raise an additional £30,000, with one-third loan. They also desired to consolidate and convert their capital into an equivalent 5 per cent. stock, and asked for the sliding-scale clauses, with an initial price of 3s. 6d., and 1s. more outside the area of Hexham. In addition to the District Council, the Corbridge Gas Company were opponents; but they only sought protection in respect of the authority asked by the promoters to supply gas in bulk outside their limits. The latter were prepared to give the Corbridge Company an undertaking not to trespass upon their district; but the petitioners were only to be satisfied by a provision in the Bill, which the promoters did not, for various reasons, think they were in a position to consent to. Regarding the opposition of the Hexham Council, in view of the excellent way in which the Company have been managed, their position was not by any means a strong one, though it was manifest the Committee were—at any rate, at one part of the proceedings—a little in sympathy with their desire to get a reduction of the proposed initial price. In addition to this question, the Council objected to the conversion of the capital into stock, in view of the possibility that they might desire to purchase the undertaking at some time—when, there was not the slightest notion. They also made the (for these days) novel suggestion that the provision in the Act of 1881 with regard to the appointment

of Directors should be amended, so as to provide that the number of the Directors should be seven, and so that they should be entitled to appoint a certain proportion of the Directors; also that some provision should be inserted restricting the minimum rate of interest upon moneys to be raised hereafter on mortgage. They further asked for the repeal of the electric lighting powers held by the Company under their Act of 1881. But, as said, the central point of discussion was the initial price. The figure proposed in the Bill was 3s. 6d.; and the price of gas is now 3s. 2d., which, by discounts, is brought down to 2s. 11½d. To conciliate the opponents, the Company offered to reduce the initial price to 3s. 4d.; but this was not satisfactory, although it left them with really little margin above the selling price of gas. On the suggestion of the Committee, the Company gave the matter further consideration, and offered another 1d., making it 3s. 3d.; but the Council held out for the monstrous drop to 2s. 8d, which Mr. E. H. Stevenson endeavoured to defend. On the side of the Company, Mr. Joseph Hepworth (who is a Director), Mr. Herbert Lees (the Manager), and Mr. Corbet Woodall appeared; and they considered that 3s. 4d. was an exceedingly reasonable figure. On the same point, this particularly sage remark fell from Mr. Woodall: "If the Company are to be punished by having their standard price fixed at a low figure because they have succeeded in reducing the price of gas to a low point, it will be an object-lesson for gas companies making application to Parliament in future." The addresses of Council were heard yesterday morning; but very early the Chairman of the Committee interrupted with the remark that they did not wish to learn anything more about the electrical powers possessed by the Company, as they saw no reason why they should repeal them. Also with regard to the protection of the Corbridge Gas Company, they were not disposed to amend the Bill. The decision of the Committee was that the Bill should proceed, but that the initial price should be 3s. 2d.—a penny below the figure to which the Company had, on the suggestion of the Committee, previously consented to go. The Council could hardly have expected that the Committee would countenance their ridiculous request for 2s. 8d. The usual report of the proceedings will be published next week.

Wisdom at Gorleston.

The people of Gorleston and Southtown are to be congratulated on having their local affairs governed by a Corporation and their gas supplied by a Company whose relations, it would seem, are dominated by a reasonableness that might with advantage be emulated in many other parts of the country. The Company have this year a Bill in Parliament of an ordinary character; but, advised by Mr. William A. Valon and their Parliamentary Agents, the Corporation desired several modifications in the clauses. Negotiations followed, and finally there was a conference, at which a Sub-Committee of the Parliamentary Committee, the Town Clerk, Parliamentary Agents, and Mr. Valon were present on behalf of the Corporation, and the Secretary and Treasurer, Mr. E. H. Stevenson, and the Parliamentary Agents attended on behalf of the Company. The outcome of this happy method of discussing *vis-à-vis* the points in question has been an agreement, which, fair and harmless to the Company, has saved the ratepayers the expense of opposition in the Committee rooms, where day by day during the sittings costs are piled up with merciless vigour over the most trivial matters. The sensible agreement arrived at in this case—credit for which must be largely due to the two experts named—should serve as a lesson for, and reproof to, bodies who are less amiably disposed one towards the other.

The Concessions.

It may be useful for the edification of such bodies to run over the main points of the agreement, to show the nature of the requirements of the Corporation, and how they were met by the Company. Clauses 5 and 8 of the Bill would have given the Company power to erect gasholders and store gas on any land wherever situate (not exceeding 5 acres) which they might in future agree to purchase. The clauses are to be so modified as to render the power conditional on the consent of the Corporation, or, failing such consent, on the consent of the Board of Trade. Clauses 9 and 20 provided for the raising of additional capital—viz., £54,000 of share capital, and £18,000 of loan capital. These amounts are to be reduced respectively to £40,000 and £13,333 6s. 8d. By the Gas-Works Clauses Act, 1847, the Company had power to form a reserve fund to the extent of 10 per cent. on their nominal capital. Under the agreement, provision is to be made for limiting this to 10 per cent. on the paid-up capital, and also for the amount to be set aside for this purpose in any one year being restricted to 1 per cent. on the paid-up capital. Regarding dividends on future capital, clause 13 provided for the maximum dividend on new capital issued as preference shares to be 6 per cent. This is to be altered to 5 per cent. By the existing law, the Company had power to apply future profits to making up dividends already paid since 1876 to their maximum authorized amounts of 10 and 7 per cent. respectively. As the Company have not paid their maximum dividends, and in several years only a small proportion of them, this provision would, in all probability, have militated very considerably against future profits being used in reduction of the price of gas. The law is to be so modified as to limit the power to pay arrears of dividends to the last ten years only—from 1893 to date. Clause 19 of the Bill, which was to empower the Company to form a renewal fund in addition to the reserve fund, is to be struck out. Then clause 20 has been amended so as to make the auction clauses applicable to loan as well as to share capital, which will prevent any sums obtained as premiums ranking as capital entitled to dividend. Clause 27 gives power to the Company to lay pipes in private streets; and, it being considered that as it stood it might hamper the Corporation when coming to deal with the making up of such streets under the Private Streets Works Acts, it is to be so modified as to make its exercise subject to the approval of the Corporation. The power also to lay pipes in streets for "ancillary purposes" is to be subject to the "reasonable consent" of the Corporation. The maximum price of gas, too, is to be reduced from 6s. per 1000 cubic feet to 4s. 9d. A further discount of 2½ per cent. (making 17½ per cent. in all) is to be allowed the Corporation upon the amount paid for gas for public lighting. This interesting agreement, it is almost needless to say, has been unanimously confirmed by the Town Council.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time: Derby Gas Bill, Shepshed Urban District Gas Bill.

Petitions have been presented against the following Bills:—

Birmingham Corporation Bill, Bradford Corporation Bill, Derby Gas Bill, Harrow and Stanmore Gas Bill, North-Western Electricity and Power Gas Bill.

The Chairman of Committees informed the House on Thusrday that the promoters of the Nantwich Gas Bill did not intend to proceed further with it.

The Select Committee to whom had been referred the British Gaslight Company (Norwich) Bill, the Chard Corporation Gas and Electricity Bill, and the Nantwich Urban District Council Bill reported that they had not proceeded with the consideration of these Bills, no parties having appeared in opposition thereto.

HOUSE OF COMMONS.

Tuesday, March 17.

GASLIGHT AND COKE AND OTHER BILLS.

On the order for the second reading of the Gaslight and Coke Company's Acts Amendment Bill,

Mr. JEFFREYS (the Deputy-Chairman of Committees) said this Bill, which was being promoted by the London County Council, sought to alter the standard price charged for gas by the Gaslight and Coke Company. The Council had every right to oppose the Bill of the Company which was also before the House; but it was a very unusual thing to bring in a measure to revise a Company's prices—he was told it was unprecedented—and he felt it to be his duty to bring the matter before the House. He did not propose to divide the House against the Bill, because he understood that the promoters had in both cases agreed to lay the Bills before a Committee.

The Bill was read a second time.

The Gaslight and Coke Company Bill and the London County Council (General Powers) Bill also passed the second reading.

The following further progress has been made with Bills:—

Bill read a second time and committed: Sheffield Corporation Bill.

Bill withdrawn: West Sussex Water Bill,

The East Ardsley Gas Bill, Ipswich Gas Bill, Newcastle-upon-Tyne Electric Supply Bill, North Middlesex Gas Bill, Sutton District Water Bill, and Walker and Wallsend Union Gas Bill have been referred to a Select Committee, consisting of Sir Henry Aubrey Fletcher (Chairman), Mr. J. A. Dewar, Mr. Maccnochie, and Mr. Toulmin; to commence their sittings to-day.

The Bath Corporation Water Bill and the Hampton Court Gas Bill have been referred to a Select Committee, consisting of Mr. Tennant (Chairman), Mr. Shepherd Cross, Mr. Osmond Williams, and Mr. Ernest Gardner; also to meet to-day.

HOUSE OF LORDS COMMITTEE.

Thursday, March 19.

PLYMOUTH AND STONEHOUSE GAS BILL.

(*Before the Earl of* DARTREY, *Chairman, the Earl of* NORTHESK, *Lord* LILFORD, *Lord* CAREW, *and Lord* SALTOUN.)

This Bill is to enable the Company to extend their limits of supply, raise additional capital, alter the standard illuminating power of the gas, fix an initial price for the out-districts, and form a renewal fund.

The Hon. J. D. FITZGERALD, K.C., and Mr. HONORATUS LLOYD appeared for the promoters. The only petitioners against the Bill—the East Stonehouse Urban District Council—were represented by Mr. VESEY KNOX.

Mr. FITZGERALD, in opening the case, said that the Bill was promoted by the Plymouth and Stonehouse Gas Company, and its main objects were to extend the limits of supply, raise additional capital, and vary the illuminating power. The Company had a good record, and had frequently been referred to in the Committee-rooms of Parliament, because they supplied gas at a lower price than any other gas company in the kingdom. This was the more remarkable from the fact that they obtained their coal supply from Durham. Their price was lower than that charged by many of the large municipalities. One of the reasons for this no doubt was that the capital was remarkably low in proportion to the volume of business done. The Company was incorporated by Act of Parliament in 1845, prior to which date the supply of gas in Plymouth and Devonport had been furnished by the United General Gas Company. In 1845, the Company were charging the very high price of 9s. per 1000 cubic feet. Some consumers in Plymouth, who were dissatisfied with this charge, formed the existing Company for the purpose of selling gas at a moderate price. They began at 6s., and had gone on steadily decreasing the price till some years ago they arrived at 1s. 9d., at which figure it now stood. The Directors hoped that by continuing the policy of the past they would be able to beat the record, and make a further reduction. Owing, no doubt, to the low price charged, there had been a very large increase in consumption. In 1892, the total output was 640 million cubic feet; and in 1902 it had risen to 970 millions—an increase of more than 300 million cubic feet in ten years. Plymouth was growing

largely; the population, which in 1891 was about 84,000, having in 1901 risen to 107,000—half of the increase being due to the extension of the limits of the borough. In the present year, it was estimated that the population of Plymouth alone was about 111,000. In addition to Plymouth, the Company supplied the adjoining small town of Stonehouse, and some other districts outside. Owing to the large increase n population, the manufacturing plant of the Company was now barely sufficient to meet the demand; and therefore contracts for further works, which would cost about £40,000, had been entered into. The tendency of the population in Plymouth, as in other large towns, was to move for residential purposes to the outskirts; and on the west or north-west a place known as Crown Hill was springing up. There were large barracks capable of accommodating 2000 or 3000 men, and the civil population also was growing; and one of the reasons why the proposed increase of capital was necessary was that the Company wished to carry their mains up to this district, and supply gas there. On the other side of Plymouth was the parish of Plymstock, which was connected with Plymouth by a toll-bridge over the Catwater. The Corporation of Plymouth had acquired the bridge, and were about to free it; and no doubt when this was done there would be a large development of building in the place for residential purposes. Under these circumstances, he asked the Committee to sanction the inclusion of Plymstock within the Company's limits. It would not be possible to supply gas to Plymstock or to Crown Hill at the very low price at present charged in Plymouth and Stonehouse, for the reason that it would be necessary to incur considerable expenditure in extending the mains. It was therefore proposed to charge consumers in these outlying districts, following the precedent laid down in many other cases, a rate of 1s. per 1000 cubic feet more than was charged in Plymouth and Stonehouse. Even with this addition, the price would be very low. If the extra 1s. were charged at present, Plymstock would only be paying 2s. 9d. per 1000 cubic feet, which was less than the Gaslight and Coke Company were now charging in London. The people in Crown Hill and Plymstock recognized that, even at this rate, they would be getting very cheap gas indeed. The existing capital of the Company in shares and stock was £310,000. In addition to this they had borrowing powers to the extent of £90,000. There was £48,570 of the capital unissued, and £20,000 of borrowing powers unexercised; but they had entered into contracts amounting to £40,000, which would practically absorb the whole of the unissued stock. They asked for power to raise an additional £100,000 of capital; and, further, for authority to borrow to the extent of £33,333. They were, of course, under the auction clauses; so that from the consumers' point of view there ought to be no objection to the increased capital powers asked for. [The learned Counsel gave a history of the auction clauses, and explained their operation.] On the capital issued under the auction clauses since 1879, premiums amounting to £55,000 had been received. It had been generally considered that Parliament should only give to a gas company capital powers sufficient to carry them on for twelve or fourteen years, so as to preserve parliamentary control. This Company, however, owing to large increases in their district, had had to come much more frequently than that. An application to Parliament was an expensive matter; and the Company therefore did not wish to have to come so often as in the past. The witnesses would state that the capital now sought would not carry them on for more than the period named. The Company were under the sliding-scale, which was an arrangement favourable to the consumer. If the price of gas was lowered by 1d. per 1000 cubic feet, the shareholders, who at present received 7 per cent., were allowed to increase the standard rate by 5s. per cent., and the stockholders were only allowed to increase their standard rate of dividend by $\frac{1}{8}$, or 2s. 6d. per cent. The result was that a reduction of 1d. in the price of gas in Plymouth meant £3700, out of which £420 or £430 was taken by the shareholders in the shape of increased dividend, and the residue went to the benefit of the consumers. He had mentioned the sliding-scale for the reason that from 1879 to 1894 the illuminating power of the gas supplied by the Company, under their Acts, was 14 candles; but in 1894, at the instance of the Corporation of Plymouth, it was raised to 15 candles. As the result of this experience, the Company had come to the conclusion that it was much better, both for the Company and the consumers, to supply gas of the lower illuminating power of 14 candles. They proposed in the Bill to follow the example of other gas companies, and go back to 14-candle gas which they supplied prior to 1894. The reason for this was that the Company used Durham coal, which naturally produced gas of about 14-candle power. If, then, they had to supply 15-candle gas, they had to use means of enrichment. This entailed expense, which fell in great part upon the consumers, and retarded a reduction in price. On the other hand, the difference, from the consumers' point of view, between 14 and 15 candle gas was so small, that for practical purposes it might be disregarded. If incandescent burners were used, the difference was imperceptible, and need not be taken into account. With an ordinary burner, it was so slight that the consumer was not able to detect it. Having described the method of enrichment (by means of carburetted water gas) adopted by the Company, Counsel said the expense of raising the illuminating power to 15 candles, as opposed to 14 candles, was about £1000 a year. Parliamentary sanction to a reduction in the illuminating power of their gas had been obtained by the South Metropolitan, Commercial, and West Ham Gas Companies. He was not able to offer any concession in price, for the simple reason that the Company were only saving £1000; whereas a reduction in price by 1d. per 1000 cubic feet would cost £3700. But the consumer would benefit, for the reason that, if the £1000 for enrichment was saved, the Company would all the sooner be able to reduce the price of gas. These were the main objects of the Bill. Plymouth was the principal district of supply—taking nine-tenths of the gas, and the demand was rapidly increasing there; and neither from the Corporation of Plymouth nor from any of the consumers was there a petition against the Bill.

Mr. VESEY KNOX: Have not they reserved their right to oppose the Bill in the other House?

Mr. FITZGERALD said that was so. They did not oppose in this House; but, of course, they had a right to oppose in the other if they chose. The Company had agreed clauses with the Corporation.

Mr. VESEY KNOX remarked that if his clients had agreed clauses, probably they would reserve their right to oppose.

Mr. FITZGERALD said there was no opposition whatever from Plymouth. There had been no petition from the town in the House of Lords; and this was a very favourable commentary upon the Bill as presented. The only petition was from the little town of East Stonehouse—a small place lying between Plymouth and Devonport. It was by no means an increasing locality; indeed, he believed that the last census showed that it was actually decreasing. The petition stated that the Company's undertaking was over-capitalized, and that any extension which was required should be paid for out of profits, and not out of capital. He maintained that such allegations as this were only excusable by the ignorance of the person who made them. So far from it being the case that the concern was over-capitalized, the Company's capital in proportion to the business done was one of the lowest in the United Kingdom—lower than that of any of the great London Companies. The petitioners also urged that the capital should be reduced, and that any extensions required should be paid for out of profits, and not out of capital. To anyone who understood gas matters, such a suggestion was ludicrous. If all the extensions required by a large and prosperous company were paid for out of profits, and not out of capital, the price of gas could never be reduced, nor could any dividends be paid to the shareholders, because the whole of the profits would be required to meet the necessary extensions. Further, it was often the complaint of consumers that gas companies were not treating them fairly, because extensions were paid for out of profits instead of out of capital. The petitioners next objected to the manufacture and supply by the Company of carburetted water gas. They said that of 900 million cubic feet supplied to consumers 400 millions consisted of water gas, which was cheap to manufacture, but very deleterious to health, and the manufacture of which, in various parts of the country, had been condemned. They submitted that the manufacture of water gas should be prohibited; but, if allowed, it should only be on condition that the price was materially reduced, and that safeguards were imposed to prevent danger to health. This was amusing, because they started by declaring that water gas was deleterious to health, and then went on to say that its manufacture should only be allowed on condition that the price was reduced.

The CHAIRMAN: What is the price in Stonehouse?

Mr. FITZGERALD said it was the same as in Plymouth—1s. 9d. per 1000 feet. Continuing, he stated that all gas companies in the kingdom were empowered to supply water gas if they liked to do so, and, in fact, it was supplied by a very large number of companies and local authorities. There was nothing in the Bill relating to water gas, and nothing special in Plymouth with reference to its use; and he contended that the question was one which must be dealt with, if at all, by the Board of Trade under a General Act making regulations which would apply to gas companies all over the country. The Stonehouse Council also objected to any lowering of the illuminating power of gas. The reduction proposed, however, would save £1000 a year in the manufacture of gas; and from this saving the consumers would gain a substantial benefit. If it increased the profits of the Company, it could only do so by producing a corresponding decrease, under the sliding-scale, in the price of gas. The petitioners urged further that if any reduction of the illuminating power was really desirable, a clause should be inserted putting on the Company the expense of providing new burners. He was not unprepared to meet the petitioners on this point. If there were any consumers in Stonehouse whose burners were not suitable for 14-candle gas, the Company were quite willing, if called upon in the next twelve months, to supply them. The petitioners also urged that, as a larger quantity of gas was now used for heating and power purposes, it was of greater importance that it should be of full calorific value; and therefore they asked that it should be tested under their supervision, and provision made for the imposition of penalties in case of default. This was a request that their Lordships should do to the Company what, so far as he knew, had never been done in the case of any other. There was no such thing as testing for calorific power known in gas legislation; and why this Company should be singled out by Stonehouse for applying such a test, he did not know. Lastly, the petitioners objected to the establishment of a renewal fund, and to the payment for renewals out of revenue. It was not proposed to pay for them otherwise than out of revenue; and the object of a renewal fund was to prevent the expense of a particular renewal, which might be very heavy in one year, being thrown on the income of that particular year, the effect of which might be to raise the price of gas. This disposed of the petition.

The following evidence was then given.

Mr. *J. A. Bellamy*, examined by Mr. HONORATUS LLOYD, said he was an ex-Mayor of Plymouth, and Chairman of the Plymouth and Stonehouse Gas Company. He gave evidence bearing out the opening statement of Counsel. He said that Stonehouse was geographically only a very small portion of the Company's district. On the basis of customers and gas supplied, it formed only about 10 per cent. of the total. There had been a large increase in the use of gas for heating and cooking purposes, and this growth was still continuing. During the last ten years, the Company had spent about £235,000; and he estimated that in the next ten years there would be a total expenditure of £160,000—£40,000 already owing for new plant, £50,000 for stoves, fires, and meters let out on hire, £30,000 for mains and meters, £30,000 for a new gasholder and tank, and £10,000 for working capital. To get the gas to outlying places involved laying mains through some districts where there was not a large population; and therefore it was considered fair the Company should have power to charge an extra 1s. per 1000 cubic feet for gas supplied outside Plymouth and Stonehouse. To this, no objection had been raised. It was proposed to reduce the illuminating power from 15 to 14 candles, as the conditions had changed very much in regard to the use of gas. What was required now was heat for the purpose of rendering incandescent the mantles which were being so largely used. He thought it was a delusion that the present burners would not go well with the reduction in candle power; but, if application were made to the Company within the next twelve months, they would supply new burners, so that the best use could be made of the altered quality gas that would be supplied.

Cross-examined by Mr. VESEY KNOX: The capital of the Company per 1000 cubic feet of gas sold was 3s. 6d. in 1891; but in 1901 it was more than double this figure. Of the total quantity of gas supplied, 40 per cent. was water gas; but this was not more than was sent out in London—by the Tottenham Company.

Mr. VESEY KNOX: That is a very exceptional case.

Mr. FITZGERALD: You must not say it is very exceptional. Liverpool gives 50 per cent.

Mr. VESEY KNOX: The general proportion is about one-twelfth.

Witness: I am not aware that it is, but it may be so.

In further cross-examination, witness said 40 per cent. was a very safe quantity, though in proportion to the average it was relatively high. The more water gas there was in the mixture, the less was the heat the consumer would get, if they supplied water gas without oil, which increased the heating power.

Mr. VESEY KNOX: And so far as you reduce the illuminating power, you reduce the heating power?

Witness: Well, there is a ratio. If you went from 15 to 10 candles, there would be a difference; but from 15 to 14 candles the difference is not considerable.

Is not the difference in heating power 10 per cent.?—We made a number of tests in Plymouth which showed that 13-candle gas had the same heating power as 15-candle. I should object to a provision preventing the Company from reducing the thermal power of the gas below 600 British thermal units, as no other company are governed by such a provision.

Are you not asking for what no other company have ever got—a reduction in illuminating power without a reduction of standard price?—I do not think any other company has asked for a reduction of 1-candle power—from 15 to 14 candles. The reductions have been, I believe, from 16 to 14 candles.

Then the reduction was 2d., or 1d. for each candle?—Yes; then the price at which the gas was supplied was 3s. 6d. per 1000 cubic feet, or double our price. A penny on 1s. 9d. is very different from 1d. on 3s. 6d. With the low price charged at Plymouth, a reduction of 1d. on the standard would mean a loss of more than £3000, and a saving of only £1000.

Mr. *Corbet Woodall*, examined by Mr. FITZGERALD, said he thought the Bill was a very ordinary and simple one, which was necessary to enable the Company to carry on their work. The average rate of increase in the past ten years had been 4·33 per cent. The capital per million cubic feet of gas sold was £372. It was hardly to be expected that in the future the Company could keep to this very low expenditure, as the capital expenses of gas undertakings were increasing materially owing to the introduction of machinery, prepayment meters, &c. He had not, for two or three years past, estimated it at a less rate than £650 per million. In the present case, having regard to the singular success of the Company, he had put down £600 per million, against the existing expenditure of £372. Taking this figure, and allowing for the increase to go on at the rate of 5 per cent. per annum for ten years, they would want £337,000 of additional capital. In that period the sale of gas would have grown to 1456 million cubic feet—an increase of 562 millions. Multiplying 562 by 600, they had £337,000 as the capital that would probably be wanted in the next ten years. He was not consulted as to the amount of capital put into the Bill, or he would certainly have advised a larger sum. The difference between 15 and 14 candle gas was very small indeed, even with an ordinary burner. The only justification for a reduction was that it would lower the cost of production, and the consumer would get the benefit of that. He could not understand the allegation in the petition that the Company were over-capitalized; and he thought it would be absolute folly to pay for extensions out of revenue instead of out of capital. Nor could he understand the allegation as to water gas, which had proved of immense value, as it gave a second source from which to manufacture gas, and the result, in many cases, had been to reduce the price and produce gas of excellent quality. If a considerable reduction in the illuminating power were granted, it would be reasonable to have an inquiry as to the calorific value of the gas; but for such a difference as was now proposed there was absolutely no reason for making provision to test. They could not lower the illuminating power without reducing the calorific value; but the difference was so minute, in a reduction from 15 to 14 candles, that it was not worth considering. Carburetted water gas had been introduced in a number of towns; but he knew of no instance in England where provision for testing for calorific value had been made. The proposal for a renewal fund was somewhat unusual; and he had only found four precedents for it. The cost of gas plant was now very heavy; and if it became necessary to rebuild any important part of the works, it would form a great burden if it had to be met in a short period. Where such expenditure was anticipated, the present custom was to accumulate a suspense account. The proposed renewal fund merely made such an account a legitimate arrangement contemplated by the Act.

Cross-examined by Mr. VESEY KNOX: The daily capacity of the works, when those in progress were completed, would be 7 million cubic feet, or, allowing one-fifth as the margin of safety, 5,600,000 cubic feet. The maximum daily output now was 4½ millions. He allowed a margin of one-fifth instead of the customary 10 or 15 per cent., because of the unusual quantity of water gas used. He did not think there was danger of appreciable loss of illuminating or heating power in conveying gas from the works to Stonehouse. Heating value in gas was very important; but not more so than illuminating power. Carburetted water gas had less than half the heating power of ordinary coal gas. The heating value was increased when an addition was made to the illuminating power.

Mr. VESEY KNOX: A difference of 1-candle power will mean 10 per cent. in the heating power?

Witness: I am quite sure it will be impossible to show that there is a difference of 10 per cent. in heating value.

What would you put the difference at?—The fact is, I am hard at work on that particular question now; and the investigations are somewhat perplexing, because they do not run quite on the same lines on all occasions. I think it almost impossible to lay down a rule here which would guide the Committee in coming to a decision. The point I put is, that the difference between 15 and 14 candles is very little. The Company cannot afford to make any allowance for money in respect of it—that is to say, they cannot make a reduction of one-third of a penny in price; but the saving that would be effected would go to aid a reduction in the charge for gas.

Suppose there is some considerable reduction in heating power (say, 7 per cent.), would not the consumers be losers by the passing of this Bill?—I think they would, granting a 7 per cent. reduction in calorific value, as against a gain of eight-ninths of the £1000.

Cross-examination continued: The calorific value of the gas supplied by the Company was 530 British thermal units; and that of the South Metropolitan Gas Company's gas (pure coal gas), about 550 units. He could not tell absolutely what would be the reduction in the heating power if there was a lowering of the illuminating elements put into water gas, not having yet made a sufficient number of experiments to enable him to establish anything like a direct comparison. He had as high returns from 14 as from 15 candle gas, while in other cases they were different. But he had not yet obtained sufficient information to enable him to lay down a curve showing any relation between the two. He was quite satisfied, however, that the difference between 14 and 15 candles was inappreciable. The calorific value of coal gas decreased with the illuminating power, and the alteration from 16 to 14 candles in the case of the South Metropolitan Gas Company meant a considerable reduction. Questioned as to whether the Mond Company did not afford a precedent for the insertion of a test for the thermal power of gas, witness said Counsel was referring to a Company which started wholly and solely to supply gas for heating and motive power; there was no paralle lbetween the two. The tendency of the Plymouth Company in future would be to supply gas for purposes in regard to which heat was the main consideration.

Mr. VESEY KNOX: Yet you object, in asking this advantage for the shareholders, to any provision which will ensure that the thermal power shall be kept up?

Witness: Because any provision that could be made would be out of all proportion to the value of the reduction to the Company. For a saving of £1000 they could not possibly afford to allow ½d. per 1000 cubic feet off the price of gas.

Would you, as an expert, object, from the point of view of the consumer, to a provision which would compel the Company to keep up their thermal power to a certain standard?—Certainly. Our knowledge is not yet sufficient for the purpose; and in this case I object to it emphatically, because the Company have shown that they are capable of managing their affairs in the interests of the consumers as well as of the shareholders.

In further cross-examination, witness agreed the carry-forward was about £21,000. The Company had power also to form an insurance fund of 5 per cent. on their capital; but they had not yet put anything to the fund. It was proposed to set aside an amount equal to 10 per cent. of the capital for the renewal fund. In reply to a question as to what reason he had to give for asking for 15 per cent. of the capital for renewal and insurance funds, against 10 per cent. which the Company were allowed to set aside under the old law, before the sliding-scale was introduced, he said he had none to give beyond what he had already stated—that the demands for expenditure on renewals were very heavy, and it was more convenient to put the money by in small amounts from year to year than to deal with it in large sums.

In re-examination, witness said that in 1902 practically all the companies which applied to Parliament for new powers adopted the standard of 14 candles, which was rather higher than in Germany.

Mr. FITZGERALD said this was the case for the promoters. In order to meet his learned friend, he had had some clauses prepared, as follows:—

> The Company shall at any time within twelve calendar months after the passing of this Act, if and when required by any consumer of the gas supplied by the Company not using incandescent burners, supply and fix, free of charge to such consumer, a sufficient number of burners suitable in all respects for the consumption of gas of the illuminating power prescribed by this Act. Notice of the provisions of this section shall be given on each demand note of the Company sent out during the said period.
>
> Provided also that the Company shall not, by the exercise of any of their powers in regard to the expenditure of capital or otherwise within the area added to their limits of supply by this section, either increase the price charged for gas within the limits of supply of the Company, as the same existed prior to the passing of the Act of 1898, or prevent or hinder the reduction of that price under the provisions of the recited Acts.

Mr. VESEY KNOX said these clauses met his objections on the points to which they related. He would now call evidence on the remaining points in dispute.

Mr. *E. H. Stevenson* stated that, in his opinion, the Company did not need the capital sought. When the works in progress were completed, they would be able to make 6 million cubic feet of gas daily, whereas the present maximum requirement was only 4½ millions. Therefore there would be a surplus of from 1½ to 2 million cubic feet daily; and they would still have £30,000 in hand. Except for mains and meters, no capital would be required until the capacity of the works had been exhausted. The Company had over-estimated their growth in taking the increase at 5 per cent. compound. In 1900, when the large increase of 14 per cent. took place, they had been spending money very largely on new consumers; but since then the number had largely decreased. The district was now practically "saturated;" and unless the Company grew very rapidly, they would not, in the next ten or twelve years, require the capital now sought. He had no objection to a reduction of the illuminating power to 14 candles, providing an equivalent was given to the consumers. He was surprised to find a company applying to Parliament for a lower illuminating power without a reduction in the standard price.

Mr. VESEY KNOX: Do you consider that, where so large a proportion of water gas is supplied, it is important the gas should be of uniform quality and heating power?

Witness: Yes; it really should be of uniform proportion—that is, the proportion of water gas to coal gas should always be the same. At

present, there is nothing to compel the Company to have it uniform. I think this is the first case of a company using so large a proportion of water gas who have come to Parliament for a reduction of their candle power. Witness added that he had recently been staying at the gas-works at West Bromwich, where carburetted water gas was used, and the Manager had informed him that he could not put in more than 12 or 13 per cent. of this gas without complaints from all users of gas-engines in the neighbourhood that the power was reduced. He saw from the books that the calorific value of the gas was lowered from 655 to 625 units when the proportion of water gas was 12½ per cent.

In further examination, witness said all gas companies were selling more gas for heating, and there was no question that in future it would be of even lower illuminating power than the Plymouth Company were now asking. He saw no objection to that, if they were put under proper regulations, and charged a proper price. In his opinion, a company ought to be required to reduce the standard at the same time as they lowered the illuminating power; and this had previously been insisted upon by Parliament. Further, he thought it would be advisable for a minimum of calorific power to be prescribed for all gas undertakings. As to the carry-forward, it would be advantageous to the consumers that it should be limited to a certain amount; otherwise there was no possibility of pressure being brought to bear on the Company to reduce the price of gas. Provision limiting the carry-forward was made by Parliament in the Lea Bridge and Brighton cases. A reasonable sum with a company like this was about £12,000; but the actual amount—between £13,000 and £14,000—was larger than it ought to be. He did not think a renewal fund was required with a company of this magnitude; but, if granted, it certainly should not exceed 5 per cent.—the amount they could now put to their insurance fund. It was unreasonable to ask for a 15 per cent. insurance and renewal fund. To carry the Company over twelve years, he would at most allow £100,000 of capital, in addition to the £30,000 of unexpended capital they now had.

Cross-examined by Mr. FITZGERALD: He was not responsible for the allegations in the petition. He did not agree that the manufacture of water gas by the gas companies should be prohibited; it should be regulated. A large number of gas companies were in Parliament last year, but no calorific test was asked for or imposed. The time, however, must come when Parliament would have to deal with new principles and ideas which arose in whatever trade might come before them; and then a new precedent must be set. As to the Company's carry-forward, he thought the greatest pressure of all might or might not be the fact that unless the Company reduced the price of gas they could not increase their dividend. A shareholder, however, might prefer an absolutely assured dividend of 11 or 12 per cent., and a large carry-forward, so that the dividend should be secure, rather than a reduction in the price of gas with a larger dividend.

Re-examined by Mr. VESEY KNOX: The Bill as it stood would cause a reduction in the heating power of the gas supplied, in consequence of a decrease in the hydrocarbons and an increase of the water gas. What the Company now supplied was a mixture of carburetted water gas and coal gas, and to give it the necessary 15-candle power, they would have to add a certain quantity of oil which, to some extent, neutralized the effect of the water gas in lowering the heating power. Water gas was made luminous, and greater heating power imparted to it by the addition of vaporized oil. For the future it would be made less luminous, and would therefore possess less heating power. Consumers would consequently have to burn more gas. They would lose on the lighting where they had ordinary burners, and on the heating where they used gas for heating, motive power, or cooking.

Mr. *W. C. Young*, one of the Gas Examiners to the Corporation of London, said he visited the works of the Company on the 14th inst., but was not allowed to test the gas. He saw no means of testing its heating power, or of ascertaining the proportion of carbonic oxide it contained. The photometric apparatus was not in operation, and would require some little attention before it could be used. Asked his opinion as to the proposed reduction of the prescribed illuminating power to 14 candles, without giving the consumer any consideration in return, he said it was a most unfair proposal. It was taking away from the gas a considerable proportion of its value, and charging the same price for it. In all the cases with which he was acquainted, there had been a reduction in the standard with a lowering of the illuminating power. If this was brought down from 15 to 14 candles, the heating power would be reduced by more than one-fifteenth—by 10 per cent., in round figures. The results he had obtained varied from 8 to 11 per cent. There were no means, in the Bill as it stood, by which, when the change was made, the consumers would have any assurance that they would obtain gas of equal heating value to that which they had previously received. It would be possible for the Company to supply carburetted water gas only, with no coal gas; and 14-candle carburetted water gas would have a heating power equal to about 70 per cent. of that of 14-candle coal gas. He was strongly of opinion that a minimum calorific value of 600 British thermal units should be prescribed.

Mr. VESEY KNOX then addressed the Committee, pointing out that, in regard to finances, his clients urged that the capital powers sought should be limited to £100,000, *plus* the £30,000 which they already had authority to raise; that the renewal fund clause should be omitted, or limited to (say) 5 per cent. on the capital; and that there should be a proviso restricting the amount which the Company might carry over. The remaining point related to the reduction in the illuminating power; and the only substantial difference between the parties was as to what was the alteration in the heating value caused by a change from 15 to 14 candles. He claimed that the evidence showed that the reduction proposed would considerably affect the consumers. Mr. Woodall had admitted that if the reduction of heating power was 7 per cent., there would be very serious loss to them; and the experience of Mr. Young proved that, instead of 7, it would be from 8 to 11 per cent. The position might be met by inserting a provision specifying that the thermal value of the gas should not be less than it was now, or by requiring the Company to make a reduction in price. It was certainly true that there was no precedent for the first of these two courses; but it was also true that there was none for what the Company proposed. In every case which had come before Parliament, where any reduction of candle power had been asked for, the parties were required to give to the consumers an equivalent advantage in the shape of a reduction in the standard price. Why should this Company be free from such a restriction? Either in one way or the other, they ought to be forced to meet this point.

Mr. FITZGERALD, in reply, said that, rather than submit to either of the two alternatives proposed, he would withdraw the clause relating to the reduction of illuminating power. Either alternative would have a most serious result upon the Company, whereas the reduction from 15 to 14 candle power would not greatly affect either them or the consumers. It would be quite impossible to consent to lower the price; because a concession of 1d. per 1000 cubic feet would be entirely disproportionate to the amount of reduction in illuminating power. It would mean a reduced income of £3700, while the economy would amount to £1000; so that the Company would lose £2700. As to the calorific value of the gas, the fact was that the matter had not yet been considered fully by any gas expert; and no one could say certainly what was the exact effect of a reduction in illuminating power on its calorific value. The only thing that could be said certainly was that between 15 and 14 candles it was not large. If it became necessary to deal with this question at all, the proper way was for the Government to pass a General Act with regard to it, as in the case of testing for illuminating power. He pointed out that the Corporation of Plymouth had a much larger interest in the question than the people of Stonehouse, yet neither the Corporation nor a single consumer in the borough had appeared before the Committee to object to the proposals of the Bill.

The CHAIRMAN, after deliberating in private with his colleagues for a few moments, said the Committee were of opinion that the Bill might proceed, subject to the agreed amendments.

The clauses were then adjusted, and the Committee adjourned.

LEGAL INTELLIGENCE.

SUPREME COURT OF JUDICATURE—COURT OF APPEAL.

Wednesday, March 18.

(*Before the* MASTER OF THE ROLLS, *and Lords Justices* ROMER *and* COZENS-HARDY.)

Lamplough v. Kent Water-Works Company—The Question of Back-Dividends.

This was an appeal against the decision of Mr. Justice Joyce, given on the 18th ult., to the effect that the defendants were not entitled to apply current profits in making up dividends to 10 per cent. for the period prior to 1864, when the Water-Works Clauses Act, 1847, was incorporated with the Company's Act passed in that year, and the North Kent Company was amalgamated with it. The case was fully reported in the "JOURNAL" for the 24th ult. (p. 486).

Mr. CRIPPS, K.C., and Mr. R. J. PARKER again appeared for the Company (the appellants) and Mr. YOUNGER, K.C., and Mr. ASHWORTH JAMES represented the respondent. The latter were not called upon; judgment being given at the conclusion of a long argument by the appellants' Counsel, who urged the same points as were submitted in the Court below.

The MASTER OF THE ROLLS said the question in this case was whether the Kent Water-Works Company were entitled, in measuring their rights to pay dividend, to take into consideration deficiencies below 10 per cent. in the years before the date at which the Water-Works Clauses Act was incorporated—viz., in 1864. The Company came into existence in 1809, and there were passed a series of Acts to which he need not refer, until he came to the one of 1864. At that time, another Water Company had come into existence, which was amalgamated with the West Kent Company; and by the Act of 1864, the provisions of the Water-Works Clauses Act, 1847, were made to apply, from and after the passing of the Act, to the whole of the undertaking of the Company. Up to that date, the Company had been unrestricted in the amount which they might levy from the consumers, and were also under no limitation as to the dividends they paid to the shareholders; but by this Act a scale of rates was laid down beyond which they were not henceforward entitled to charge consumers—this being the condition of affairs to which the Act of 1847 applied. Section 75 of the Act, which was the one on which the question turned, provided that the profits of the undertaking to be divided in any one year should not exceed the rate prescribed in the particular Act of a Company; or where no rate was prescribed (as was the case here), it should not exceed 10 per cent., which in such cases should be deemed to be the prescribed rate, unless a larger dividend were at any time necessary to make up the deficiency of any previous dividend which should have fallen short of the annual rate. The Company had from year to year lately paid considerably more than 10 per cent., in view of the fact that since 1864 they had for some time paid less. than this. They were now, however, drawing to the end of that period They had made up the shortages of the years since 1864, and had practically come to the date when it was necessary for them, if they were to go on, to find out whether they were entitled to pray in aid deficiencies before 1864, so as to justify them in distributing by way of dividend something more than 10 per cent. It was contended for the Company, in a very ingenious argument, that they were

entitled to go behind the period at which the Act of 1847 was incorporated, and treat the deficiencies accruing before this provision was applicable to them at all as enabling them now to enlarge their dividend beyond 10 per cent. It seemed to him, on the fair grammatical construction of the section, that this contention could not be supported. To begin with, the words in which the Act was incorporated were: "The Water-Works Clauses Act shall apply, from and after the passing of this Act, to the whole of the undertaking" of the Kent Water-Works Company. These words pointed to the application in future of the provisions of the Act of 1847. Those provisions were contained in section 75, which still spoke of the future. From the date at which the Act applied, certain rights were given; and it spoke from the time when it was incorporated. When it referred to a deficiency in any previous dividends, it was providing for the future. When, in future, they came to distribute a sum by way of dividend, and found they had more in hand than would suffice to pay the prescribed rate, they looked back to see whether, from the time the 1847 Act came into operation, there had been a deficiency in any previous year. There could not be any in the first year, but there might be in the second or third. They were exactly in the same position as a company that came into existence with these rights, limitations, and obligations on the day the Act of 1847 was incorporated. They were not bound, unless Parliament compelled them, to incorporate the Water-Works Clauses Act into their undertaking; and if they did it of their own free will, they probably did so because, on the whole, they thought the advantages were equivalent, and probably more than counterbalanced any disadvantages. They had not heard all the numerous advantages which were contained in the Act—advantages to the public as well as to the Company. But he had no doubt they existed; and the Legislature, it seemed to him, imposed on them certain obligations in return for the advantages conferred. He therefore saw no injustice in cutting them off from certain rights that they then enjoyed, which up to that date had not returned any very large profit to them, because they were not in a very prosperous condition, and he did not think they had any immediate hope of being able to pay 10 per cent. It probably did not occur to them that they were giving up anything of any value when they undertook to limit their dividend to this rate, seeing that up to that time it had never gone beyond 6 per cent. There was, therefore, no injustice in their undertaking an obligation to fix their rates and possibly to reduce them, getting at the same time the right to pay dividends to the extent of 10 per cent., with the limitation of not paying more, unless they could show there was a previous year to which that dividend might be applied. This seemed to be the scheme of the Act; and there was no injustice in giving the Act its natural construction—viz., that it took effect on and after the passing of the Act of 1864. Mr. Parker had addressed a very ingenious argument to the Court, which he hoped he understood; but he did not quite see its application to the question whether or not the operation of the Act of 1847 was retrospective. At any rate, it was clear that at the bottom of the argument lay this—that the word "dividend" in the 75th section meant, not dividend in the popular sense, in which ordinary persons used it, but the sum they received, divided up, and paid as a quotient to them. This was the sense in which, throughout these proceedings, it had been used by Mr. Parker's clients in the documents they had put in, in which they gave the rates of dividend paid; and it was the sense in which it had been used in the order of the learned Judge, and he believed also in the notice of appeal. That showed the sense in which the word "dividend" had been used by all the parties. Mr. Parker said the word "dividend" in the 75th section meant, not dividend in the popular sense, but the sum to be divided—dividend in the technical sense. On looking to the Act itself, he found in the next section the word "dividend," where Mr. Parker admitted it could only have its ordinary popular meaning. In several succeeding sections there were instances in which the word could only have its ordinary meaning—not the whole dividend, but the special part allotted by way of quotient to the individual shareholders. So that Mr. Parker started with a strong presumption against him when he urged that, in this particular section 75, the word was used in the strictly technical Latin sense, when in all other cases it was employed in the popular sense. Taking section 75 itself, it seemed to him that only by an artificial, refined train of reasoning could there be put on it any other than the popular one. It seemed to him the Act was capable of a very simple and natural meaning, applying to the words their ordinary grammatical sense; and that no injustice whatever was done by giving it that meaning. In point of fact, he thought the judgment of the learned Judge, although very short, was perfectly right; and he should not have added anything to his approval of it but for the ingenious argument of Mr. Parker, in justice to which he had said a few words. The appeal must be dismissed.

Lords Justices ROMER and COZENS-HARDY also gave judgments, more briefly, to the same effect.

Mr. YOUNGER said the motion had served its purpose; and he assumed his friend would now assent to treating this as the trial of the action—taking a declaration in the form asked in the statement of claim, with a perpetual injunction, and the costs to be dealt with in the same way as in the Court below.

An Offence under the Factory Act.

At the Sevenoaks Petty Sessions, last Friday week, the Sevenoaks Gas Company were summoned for not keeping a satisfactory and general register of employees under sixteen years of age, according to law, and also for not affixing an abstract of the Factory Act on the walls of the works. Mr. Edward Arston stated the facts; and Mr. W. J. Dougall, the Manager of the Company, pleaded guilty, and stated that he was not aware that the Act in this particular applied to a Gas Company. A fine of £1 in each case, with a total of £1 3s. 6d. costs, was imposed.

The Darfield Urban District Council have resolved to light the township with 32 "Lucas" lamps of 700-candle power each; the estimated cost being £420.

MISCELLANEOUS NEWS.

PARIS GAS SUPPLY.

The Competition for the New Concession.

In the "JOURNAL" for the 3rd inst., we recorded very briefly the progress of the inquiry which is going on in Paris on the subject of the control of the gas supply of the city at the expiration of the Company's concession on Dec. 31, 1905. It may be remembered that this question is engaging the attention of a strong Special Committee of the Municipal Council, presided over by M. Deville, as well as by the Council itself; and when the matter was last referred to, the latter body had arrived at the important conclusion, in support of the opinion enunciated by the Prefect of the Seine, that municipalization was out of the question. It was then proposed by M. Grébauval that the gas undertaking should be worked by means of a loan of 200 million francs, to be redeemed by a sinking fund in 35 years; but the Council passed the proposal to the Committee for consideration. This was the point reached on the 26th ult., when the gas question had to give place to other matters.* The Committee, however, were still busy with it; and on the 6th inst. a Sub-Committee, to whom had been entrusted the duty of investigating the merits of the various schemes, formulated an important series of resolutions. In the first place, they rejected the principle of direct control; and next they decided that the future concessionary company would have to undertake that the preferential annuities to be borne by the undertaking should not exceed the rate which would be paid by the City for a direct loan. They further determined that the duration of the concession should be 35 years; but that the City should have the option of purchase at the end of 20 years, under conditions to be determined. The concluding point related to the employees; and on this matter it was decided that the concessionaire would have to accept in advance the conditions laid down by the Municipal Council for placing the workmen upon the same footing as those in the service of the City These proposals came before the Committee at their meeting on the 9th inst., and were adopted almost in their entirety. The suggestion for a big loan to be raised by the City, which was favourably regarded by M. Sauton, who has for years made a study of the gas question, was not entertained.

The next day the Committee gave audience once more to the promoters of the various schemes which had been submitted to the Municipality for consideration; the representatives of the Gas Company (MM. Pernolet and Camus) being the first admitted. The Directors had sent in an amended scheme, under which gas would be sold at 18c. per cubic metre from 1916 to 1926, at 16c. from the latter year to 1936, and at 14c. for the rest of the 35 years of the concession. Questioned as to what portion of the charge per cubic metre would go to the Municipality, M. Pernolet replied that the Company did not consider that they ought to make any change in the arrangement they had proposed for sharing their profits, under which the City would receive, during the term of the concession, a sum of 600 million francs. At the same time they were willing to reduce their share of the profits for the first two years, in order to increase that of the City. The Company would also continue to relieve the existing small consumers of the incidental expenses attending their supply; but new customers would have to bear them. The parties interested in the De Sinçay scheme were next introduced. They accepted the following conditions: (1) A fixed payment to the Municipality of 5c. per cubic metre of gas consumed, instead of a minimum proportion of the profits; (2) a rate of interest not exceeding that which the City would pay for a loan; and (3) the special conditions relative to the employees. The parties promoting the other schemes had audiences the next day; and at the close of the interviews it was decided to nominate a reporter to present the whole matter to the Council. Subsequently M. Ernest Caron, the Chairman of the Budget Committee, was selected for the duty.

On Monday last week, the Council resumed the discussion of the question; and the entire sitting was occupied in settling the conditions to be imposed upon the parties to whom the new concession would be eventually granted. The first thing determined upon was that the small consumers are to be relieved of the expenses incidental to obtaining their supply of gas. This decision cleared the ground for M. Caron, who explained, in clear and precise language, the reasons which had led the Committee to submit for consideration the series of resolutions they had entrusted to him. The first placed upon the concessionaire the duty of repaying to the Municipality the amount sacrificed in consequence of the reduction in the charge for gas at the commencement of the present year—that is to say, the difference between 30c. and 20c. per cubic metre for all gas consumed for private purposes in the last three years of the concession. After some discussion, this was confirmed by 41 votes to 28. The second resolution—by which the concessionaire undertook to acquire, on behalf of the City, who would immediately become the owner, the whole of the Gas Company's assets, which would be handed over free of cost at the expiration of the concession—was referred back to the Committee. By the third resolution, the concessionaire agreed that the interest on the loan raised to pay the sums above referred to, as well as the interest and sinking fund charges on the general capital, should not burden the undertaking with a greater amount than that which the City would have paid on a loan negotiated by itself. This was adopted by 40 votes to 9. The further proceedings were adjourned.

On Wednesday, the first business was the consideration of the second resolution which had been referred back to the Committee. It was returned with an amendment, and in this form was adopted. The next resolution (the fourth), relating to the paying off of the

* A verbatim report of the proceedings at the meetings of the Council on Feb. 25 and 26 has been issued, as a supplement to the number for the 5th inst., by our contemporary the "Journal des Usines à Gaz." It occupies 38 large closely printed pages.

share capital, was confirmed without discussion. The fifth was more important, as it dealt with the amount to be handed over to the City, and the price to be charged for gas. A proposition was discussed for bringing the price down to 15c. per cubic metre as from 1906, unless a higher figure should be necessary during the time required for clearing off the amounts arising from the reduction effected in anticipation in January of the present year. Several amendments to this proposition were moved; but precedence for it was carried by 38 votes to 33. The first paragraph, fixing the price of gas at the maximum of 15c. per cubic metre (3s. 5d. per 1000 cubic feet) was passed by 49 votes to 2; and the second, relating to the payment to be made to the City, was carried by a show of hands. An amendment proposing that the amount should be fixed at 18 million francs was referred to the Committee. The next three resolutions were held over; but the succeeding one was adopted. The discussion was then adjourned till Friday.

The proceedings on Friday opened with the consideration of the sixth resolution of the Committee, fixing the length of the concession at 35 years, but giving the City the option of cancelling it at the end of 20 years without indemnification. The term proposed caused some astonishment; but M. Caron urged that it was necessary in order to enable the concessionaire to clear off his liabilities. Moreover, the City would have the power to bring the arrangement to a close after 20 years, so that there was no need for alarm. Even this period, however, was considered by M. Grébauval to be too long; and accordingly he suggested that only 15 years should be allowed. On the question being put to the vote, the Committee's proposal was rejected. This decision brought up the Prefect of the Seine, who pointed out that if the term of the concession were very much shortened, there would be no applicants capable of offering the guarantees which the City had the right to look for from them. This argument had the effect of directing the attention of the Council to this matter, from the new standpoint taken by M. de Selves; and the result was the confirmation of the Committee's resolution —a concession for 35 years, terminable, at the option of the City, after 20 years, without compensation. The seventh resolution set forth that the employees should be placed on the same footing as if the gas undertaking were being carried on as a municipal enterprise. Various amendments were proposed which considerably changed the scope of the resolution; and eventually it was adopted in its amended form. Then came the eighth proposal of the Committee, which empowered the City Engineers to draw up a scheme for the technical management of the undertaking, which would have to be accepted by the concessionaire, and gave the City the right to control the manufacturing and office arrangements, and exercise supervision over the erection and maintenance of the plant. This was adopted, subject to certain amendments bearing upon the charges for maintenance and the letting of meters. This disposed of the three resolutions held over; and as the final one (the ninth) was passed on Wednesday, the consideration of the scheme submitted by the Committee was brought to a close. It now remains to be seen how the various competitors for the new concession will regard the conditions under which it will have to be accepted.

LEICESTER GAS AND ELECTRICITY SUPPLY.

At the Meeting of the Leicester Town Council last Wednesday—the Mayor (Alderman Vincent) presiding—the Gas and Electric Lighting Committee presented a report on the working of the two undertakings controlled by them. With regard to gas, they stated that the accounts for the six months ending Dec. 31 showed that the net profit was £17,749, out of which had been paid £5738 into the sinking fund; leaving a balance of £12,011. This, added to the balance of net profit (£8022) for the half year ending June 30, 1902, made a total of £20,033 to be applied to the district fund at the close of the current financial year (the 31st inst.). The Committee recommended that the total net balance should be so applied. They also reported that the accounts of the electric light undertaking for the latter half of the past year showed that, after paying interest on capital, and £2505 on account of the sinking fund, there was a profit of £2686. The profit for the half year ended June 30 was £2018; or for the year, £4704.

Mr. Edwards moved the adoption of so much of the report as related to gas. He said they would see that the capital spent had been £1,037,025, which meant that they had overspent their authorized capital by £35,336. They had powers for raising more money; and he supposed the Finance Committee would, when it was opportune, proceed to do this. The expenditure in the manufacture of gas during the half year had been, first, £47,430 on coal, or £12,271 less than in the corresponding six months. Oil and coke for water gas had cost £4114, or an increase of £3133. Wages for carbonization had amounted to £10,683, or a decrease of £1458; and repairs and maintenance of works had cost £9888, or a decrease of £2902. In all, they had spent in the manufacture of gas £76,705, or a decrease of £13,089. In distribution, they had expended £3207 in salaries, £3505 in the repair and maintenance of mains, and £8263 in repairing, renewing, and refixing meters and cooking-stoves. The total cost of distribution had been £14,976, or an increase of £903. Rates and taxes had amounted to £8934, or an increase of £886. This increase was due to the reassessment of the borough and additional income-tax. Management had cost £3677, making a total expenditure of £104,403. On the other side, they had sold gas to the amount of £108,784, or a decrease of £984. Rental of stoves had brought them in £1381, or an increase of £112. Residual products had realized: Coke and breeze, £17,235; tar and ammoniacal liquor, £11,052. The total receipts had been £139,613. Deducting from this the expenditure of £104,403, they had a balance to put to the profit and loss account of £35,210. Out of this they used £18,075 in paying interest on capital, and put £5737 to sinking fund, which left £12,011 as total profit for the half year. This, with the profit from the preceding half year, made a profit for the whole year of £20,033. In turning to the general balance-sheet, they would see that the sinking fund was now £138,089, and that they had a reserve fund of £6000. He thought the balance-sheet would be as satisfactory to the Council as it was to the Committee. The year they had just gone through was an anxious one for the Committee. They reduced the price of gas 2d. per 1000 cubic feet; and with this reduction they were unable to say what profit they would really make on the year. If they had maintained the price as in the preceding year, they would have had a profit of £15,000 more than now. He had no doubt that this £15,000 would have been very useful, and that they would have been able to have kept the rates on the same level as in the preceding year. But it had been the principle of the Committee that the consumer, who made the profits, should largely share in the profits. The ratepayer, as such, who was responsible for the capital of the undertaking, had his share of profit by receiving £20,033 for the relief of the rates. The profit had been made by using their splendid plant to the best advantage, and by the strenuous efforts of the Engineer (Mr. Alfred Colson), ably seconded by his staff and workmen.

Mr. Flint seconded, and the resolution was agreed to.

Mr. Edwards then moved the adoption of the portion of the report relating to the electric lighting department. Turning to the capital account of the department, he said they had spent a total of £211,843, and that they had overspent their capital by £30,777. It would therefore not be very long before they would have to come to the Council and ask for powers to raise more money. From the revenue account, it would be seen that they had spent £5299 during the half year, or an increase of £1519 on the preceding six months. This included an increased payment of rates to the amount of over £600 under the new assessment. Their total bad debts for the half year amounted to 1s. 11d. On the other side, from the sale of current they had received £12,916, which was an increase of £2961; and for rent of meters, £462 —making a total income of £13,574, which, after deducting expenses, left them £8275. Of this, they spent £3043 in interest charges, and added £2545 to the sinking fund, leaving a balance in hand for the half year of £2686, or an increase of £1777. The net profit made was £5499, which the Committee recommended should be again carried forward. Turning to the general balance sheet, it would be found that the sinking fund amounted to £17,291, and they had a reserve of £800. The half year they had gone through in this department was the best they had had; and their profits were a record. The increase for the year had been about 15 per cent., which was, he thought, a very creditable increase. As it was impossible to know, at this stage of the department's existence, the life of the plant and machinery, they recommended that the profit should be still carried forward; so that if the question of renewals came on in the near future, they would be able to pay for them out of revenue, instead of coming on the rates. Their central station was now complete; and they had a station which could turn out more light than it was doing. If the present rate of increase continued, they would be able for some time, with the plant they had in hand, to cope with it. They hoped the department would go on, from success to success, and that before many years had elapsed they would be able to do a good deal more for the town than they were at present doing.

Mr. Flint seconded.

Mr. Shires said he should oppose the carrying forward of the balance; and in order to put his opposition in concrete form, he moved a formal resolution that the sum of £4000 be carried to the credit of the district fund from the profits in hand on the electric light undertaking. The grounds he had to urge might be capable of explanation; but he was going to challenge the accuracy of the statement of accounts. He found, on examination of the statements which had from time to time been presented to the Council, and from the abstract of accounts, that if the whole amount of the profits derived from the electric light department since Dec. 31, 1899, had stood to the credit of the account, instead of now having a balance of £5499 in hand, they would have had a sum of £9008. He asked the Chairman how the discrepancy between the two amounts was to be explained. At any rate, there seemed to be ground for inquiry. Having regard to the increase in the rates which would be brought before them that evening, he strongly urged that the electric light profits, instead of being carried forward should be applied to the reduction of them.

Mr. Yearby seconded the amendment.

Dr. Davies asked how the reserve fund of the department was at present invested.

Mr. Edwards, in reply, said the £800 actually in reserve was invested by the Finance Committee. He supposed that what Dr. Davies really wanted to know was what was done with the balance carried forward. As they had overspent their capital largely, this balance enabled them to borrow less than they would otherwise have had to. With regard to Mr. Shires's amendment, the Committee accepted the figures he had put forward. But he would like to point out that Mr. Shires had overlooked one or two things which had appeared in the balance-sheets. It would be remembered that a year or two ago they put in some new dynamos in place of old ones which they had. They were anxious to charge the cost (£3000) to capital account. The Local Government Board, however, disallowed it; and they had to pay it out of revenue. This was the explanation of the reduction in the total amount of profits from the commencement of the undertaking. With regard to the handing over of £4000 to the relief of the rates, he maintained that it would be bad financial policy to do this. They were anxious that the electric lighting department should never have to make any call upon the rates; but if these profits were handed over, they would certainly have to do so when the time came for the renewals which would probably be required. He would just point out that they had written off £500 for obsolete meters; and they had £1000 more to write off. Then one of the main cables was giving out; and the renewal of this would cost them £2000.

The amendment was rejected, and the resolution agreed to.

The Butterley reservoir, belonging to the Huddersfield Corporation, has already cost upwards of £304,000, which is more than double the original estimate; and it is stated that it will cost about £90,000 more to make the reservoir hold the quantity of water it was intended to hold.

OTTOMAN GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held last Tuesday, at the London Offices, No. 9, Queen Street Place, E.C.—Colonel JAMES LE GEYT DANIELL in the chair.

The SECRETARY (Mr. Thomas Guyatt) having read the notice convening the meeting, and the report of the Auditors,

The CHAIRMAN proceeded to move the adoption of the report and accounts. The latter he thought would speak for themselves; and he was bold enough to express confidence that the shareholders would regard them as being very satisfactory. Smyrna and the surrounding districts had unfortunately last season been subjected to a bad harvest, which had adversely affected all classes, whether individually or collectively in business; and this circumstance had been mentioned as a cause of the check to the usual increase in the gas-rental—the increase in the half year to Dec. 31 having been only about £353, the whole of which had to be credited to the private consumers. Before going through the accounts, he would like to refer specially to a statement in the report announcing the loss that had been sustained, by the Directors as well as by the Company, owing to the death of Mr. Charles Gandon—a gentleman whom the shareholders had seen there upon every occasion for longer than he (the Chairman) could remember, because Mr. Gandon's connection with the Company dated back to a time before his own commenced. Mr. Gandon, as the shareholders knew, had been of the greatest possible assistance to the Company, with his capable opinions and his sound judgment. It affected every member of the Board, as it would have done the shareholders if they had been present, to see how he struggled with a malady against which there was no fighting; and it might be some satisfaction to those left behind to know that at all events he was released from a most terrible and painful disease. The Directors had elected to the vacancy thus caused Mr. A. M. Paddon; and he thought the shareholders would agree that the selection of a man who was conversant with all matters connected with gas would be of great advantage to the Company. They had also the satisfaction of seeing their old friend Major Stephenson R. Clarke back at the Board in good health, after a long absence serving his country in South Africa. Taking the accounts in detail, it would be noticed that they had now done away with the net revenue account, because there was no need for it. The interest on debentures had hitherto been charged to this account; but last year the Directors came to the conclusion that it belonged to the general expenses, and so it had been included in this item. This left only the payment to the Turkish Government in the net revenue account; and now this had also been carried to the revenue account. In the half year under review, coals had cost £4787, against £6769 in the corresponding period of 1901. This showed a decrease of £1982. Wages and materials figured at £1094, as compared with £962; and lamp lighting had cost £20 more. With regard to salaries and office expenses at Smyrna, which amounted to £1371 as against £1175, it must be remembered that they had last half year the benefit of their Manager's presence in England; and they paid his expenses out and home. Rent, interest, salaries, and office expenses included, as he had already explained, the interest on the debentures £585; and it also included, he was happy to say, £50 increase for the half year of the salary of their Secretary. Mr. Guyatt had hitherto been remunerated at a rate which was quite inadequate to his services, and was so still. The amount received for public lighting was £4317, and that from general consumers £9030—which showed a slight increase in the latter item only. Residual products had realized £2912, against £3049; and profits on fittings, meter-rents, &c., amounted to £928, as compared with £1172. There was thus a profit balance of £4591. They had used 4650 tons of coal in the half year, or 54 tons more than in the corresponding six months. The make of gas per ton—10,547 cubic feet—was very satisfactory; and the percentage of unaccounted-for gas was 10·4. The total quantity of gas made was 49,040,000 cubic feet. He would remind the shareholders that the new concession under which they were now working began only on Oct. 19 last—that was to say, it had at the present time forty years, less about five months, to run. The depreciation fund invested, and to be invested, amounted to £6326; and they had since (although it did not appear in the accounts) placed £2000 to an account for debenture redemption, which he thought they would admit showed some prudence at any rate in the conduct of the affairs of the Company.

Major STEPHENSON R. CLARKE seconded the motion.

Mr. W. HUGHES said he noticed the depreciation fund was invested in Consols and 3 per cent. debenture stock of the East London Water Company. The latter was practically a defunct Company; and even though the security might be good, he did not see the reason for placing their money in this particular stock.

The CHAIRMAN replied that they had been given to understand these debentures were absolutely guaranteed by the Water Trust, and so were an unquestionably good security. The depreciation fund investments were taken at cost price.

The resolution was then carried unanimously; and a dividend at the rate of 7 per cent. per annum on both classes of shares was afterwards declared.

On the motion of the CHAIRMAN, seconded by Mr. H. W. ANDREWS, Mr. Paddon was re-elected a Director; and the Auditors (Messrs. T. H. Cooke and A. W. Cooper) were also re-appointed, on the proposition of Mr. A. W. OKE, seconded by Mr. HUGHES.

Mr. HUGHES proposed a vote of thanks to the Directors, the Secretary, the Engineer (Mr. John Gandon), his Assistant (Mr. Hadkinson), and the staff in London and at Smyrna. He thought they ought to convey to Mr. Gandon an expression of the regret they felt at the death of his father.

Mr. OKE, in seconding, remarked that the Company were now in a stronger position because of the new concession; and they were writing off a large sum for depreciation.

The CHAIRMAN and SECRETARY briefly returned thanks.

GAS AND WATER COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 747.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
590,000	10	Oct. 15	10½	Alliance & Dublin 10 p.c.	18½–19½	..	5 7 8
100,000	10	,,	7½	Do. 7 p.c.	13–14	..	5 7 2
200,000	5	Nov. 13	6½	Bombay, Ltd. . .	5⅝–6⅛	..	5 4 0
40,000	5	,,	6½	Do. New, £4 paid	4¼–4½	..	5 9 5
380,000	Stk.	Feb. 26	12	Brentford Consolidated	242–247	..	4 17 2
286,700	,,	,,	9	Do. New . . .	177–182	..	4 18 11
50,000	,,	,,	5	Do. 5 p.c. Pref. .	133–138	..	3 12 6
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb. .	110–113	..	3 10 10
220,000	Stk.	Mar. 12	10⅝	Brighton & Hove Orig.	207–212*	..	5 1 5
246,320	,,	,,	7½	Do. A. Ord. Stk. .	151–155*	..	5 0 0
460,000	20	Sept. 26	10	British	39½–40½	..	4 18 9
50,000	10	Aug. 14	12	Bromley, Ord. 10 p.c. .	—	..	—
82,850	10	,,	9	Do. 7 p.c. . . .	—	..	—
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	10½–11	..	6 7 3
250,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb.	92–94	..	4 5 1
150,000	20	Mar. 12	8½	Cagliari, Ltd. . .	23–25*	..	6 12 0
100,000	10	Sept. 26	10	Cape Town & Dis., Ltd.	15–16	..	6 5 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	53–55	..	5 9 1
1,375,000	Stk.	Feb. 26	5	Commercial 4 p.c. Stk.	105–108	..	4 12 7
503,750	,,	,,	4¾	Do. 3½ p.c. ,,	99–102	..	4 13 2
407,812	,,	—	3	Do. 3 p.c. Deb.,,	90–91	..	3 4 6
800,000	Stk.	Dec. 11	8	Continental Union, Ltd.	115–125	..	6 8 0
200,000	,,	,,	7	Do. 7 p.c. Pref.	140–145	..	4 16 7
575,000	Stk.	Feb. 26	5⅜	Crystal Palace Ord. 5 p.c.	115–120	..	4 8 10
60,000	,,	,,	5	Do. 5 p.c. Pref. .	120–125	..	4 0 0
106,158	,,	Jan. 15	5	Do. 5 p.c. Deb. Stk.	137–140	..	3 11 5
486,090	10	Jan. 29	10½	European, Ltd. . . .	18–19	..	5 10 6
354,060	10	,,	10½	Do. £7 10s. paid	13–14	..	5 12 6
15,243,200	Stk.	Feb. 12	4⅞	Gas-light and Coke { 4 p.c. Ord. . .	81–83	−1	5 5 10
2,600,000	,,	,,	3½	3½ p.c. max. .	85–87	..	4 0 6
3,799,735	,,	,,	4	4 p.c. Con. Pref.	105–108	..	3 14 1
4,193,975	,,	Dec. 11	3	3 p.c. Con. Deb.	90–92	−1	3 5 3
252,500	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	90–95*	..	5 5 3
70,000	10	Oct. 30	8	Hongkong & China, Ltd.	15–16	..	5 0 0
3,800,000	Stk.	Nov. 13	10	Imperial Continental .	204–207	..	4 16 7
473,600	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	100–103	..	3 8 0
165,242	Stk.	Mar. 12	6	Lea Bridge Ord. 5 p.c.	115–120*	..	5 0 0
561,000	Stk.	Feb. 26	10	Liverpool United A	219–221	..	4 10 6
718,100	,,	,,	7	Do. do. B .	161½–163½	..	4 5 8
306,083	,,	Dec. 31	4	Do. do. Deb. Stk.	114–116	..	3 9 0
75,000	5	Dec. 11	5	Malta & Medn., Ltd. .	4⅜–5	..	5 0 0
560,000	100	Oct. 1	5	Met. of Melbourne { 5 p.c. Deb. 4½ p.c. Deb.	105–109	..	4 11 9
250,000	100	,,	4½		103–105	..	4 5 9
541,920	20	Nov. 13	3½	Monte Video, Ltd. . .	9⅝–10⅛	..	6 13 4
1,515,892	Stk.	Feb. 20	4½	Newc'tle & G'tesh d Con.	103⅜–104⅜	..	4 6 2
376,855	Stk.	Jan. 2	3½	Do. 3½ p.c. Deb.	97–98	..	3 11 5
300,000	Stk.	Nov. 27	8	Oriental, Ltd. . . .	143–148	..	5 8 1
600,000	5	Sept. 26	7	Ottoman, Ltd. . . .	6–7	..	5 0 0
					* Ex. div.		

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.	GAS COMPANIES.			£ s. d.
105,005	Stk.	Jan. 15	6⅛	Ply'mth & St'house 5 p.c	127–132	..	4 12 9
851,070	10	Oct. 15	7	River Plate Ord. . .	10¾–11¼	..	6 4 5
300,000	Stk.	Dec. 30	4	Do. 4 p.c. Deb..	93–95	..	4 4 3
250,000	10	Sept. 26	8	San Paulo, Ltd.. . .	12–13	..	6 3 1
135,000	Stk.	Mar. 12	10	Sheffield A	233–235*	..	4 5 1
209,984	,,	,,	10	Do. B	233–235*	..	4 5 1
523,498	,,	,,	10	Do. C	233–235*	..	4 5 1
103,235	Stk.	Sept. 26	5	Shrewsbury Ord, 5 p.c.	113–116	..	4 6 2
6,000,000	Stk.	Feb. 12	5⅓	South Met., 4 p.c. Ord.	117–120	−1½	4 8 10
1,780,000	,,	Jan. 15	3	Do. 3 p.c. Deb. . .	91–93	..	3 4 6
380,940	Stk.	Nov. 13	5	Southampton Ord. . .	103–107	..	4 13 6
87,950	,,	Jan. 15	4	Do. 4 p.c. Deb.	100–103	..	3 17 8
120,000	Stk.	Feb. 26	6	Tottenham and Edmonton { A. 5 p.c. B. 3½ p.c.	115–120	..	5 0 0
300,520	,,	,,	4½		93–96	..	4 13 9
182,380	10	Dec. 30	8	Tuscan, Ltd.	8¼–9¼	..	8 8 6
149,900	10	Jan. 2	5	Do. 5 p.c. Deb. Red.	94–96	..	5 4 2
730,872	Stk.	Mar. 12	5	West Ham, 5 p.c. Ord.	95–100*	..	5 0 0
				WATER COMPANIES.			
780,662	Stk.	Dec. 30	11⅛	Chelsea, Ord. . . .	315–325	..	3 10 9
150,000	,,	,,	5	Do. 5 p.c. Pref. .	150–155	..	3 4 6
100,000	,,	,,	4½	Do. 4½ p.c. Pref. '75	138–143	..	3 2 11
175,785	,,	Sept. 26	4½	Do. 4½ p.c. Deb. .	140–145	..	3 2 1
1,720,560	Stk.	Oct. 15	8	East London, Ord.. .	228–233	..	3 8 9
654,740	,,	Dec. 11	4½	Do. 4½ p.c. Deb. .	142–147	..	3 1 3
1,282,943	,,	,,	3	Do. 3 p.c. Deb. .	97–99	..	3 0 7
700,000	50	Dec. 11	8	Grand Junction { 10 p.c. max.. 4 p.c. Deb..	117–122	..	3 5 7
310,000	Stk.	Sept. 26	4		125–130	..	3 1 7
708,000	Stk.	Feb. 26	10½	Kent	295–305	..	3 8 10
160,000	,,	,,	7	Do. New, 7 p.c. max..	195–205	..	3 8 4
1,043,800	100	Dec. 30	11	Lambeth, 10 p.c. max..	305–315	..	3 9 10
406,200	100	,,	8½	Do. 7½ p.c. max..	220–230	..	3 13 11
350,000	Stk.	Sept. 26	4	Do. 4 p.c. Deb..	125–130	..	3 1 7
500,000	100	Feb. 12	12⅛	New River, New Shares	390–400	..	3 4 0
1,000,000	Stk.	Jan. 29	4	Do. 4 p.c. Deb..	125–130	..	3 1 7
902,300	Stk.	Dec. 11	7	South-wark and Ord. . . . 7½ p.c. max. 5 p.c. Pref.	200–205	−3	3 8 4
126 500	100	,,	7		190–200	−5	3 10 0
489,200	Stk.	,,	5		151–154	..	3 4 11
1,019,585	,,	Oct. 15	4	Vauxhall { 4 p.c. A Deb.	123–128	−2	3 2 6
1,155,066	Stk.	Dec. 11	10	West Middlesex. . .	290–300	..	3 6 8
200,000	,,	,,	4½	Do. 4½ p.c. Deb. .	140–145	..	3 2 1
200,000	,,	Mar. 12	3	Do. 3 p.c. Deb. .	95–97*	..	3 1 10
					* Ex. div.		

WREXHAM GAS COMPANY.

At the Annual General Meeting of the Wrexham Gas Company last Friday, the Chairman (Mr. J. Oswell Bury) had a favourable report to place before the shareholders. The receipts from the sale of gas during 1902 amounted to £15,194, compared with £14,407 in the previous twelve months—or an increase of about 5½ per cent. An expenditure of £4112 was incurred on capital account, for new buildings, manufacturing plant, mains, meters, and cookers; and £2081 was spent out of revenue on repairs, renewals, and maintenance of works. The principal item of capital expenditure was for the erection of new purifiers and rebuilding the purifying-house, the total cost of which amounted to £4000. The whole of this work was carried out by Messrs. Gibbons Bros., of Dudley, under the supervision of the Company's Manager (Mr. J. Braithwaite), to whom, the Chairman remarked, the greatest praise was due for having successfully arranged for the erection and connection of the new purifiers while the old ones were in action on a lower floor. The cost of purification, which in 1897 was over £4 per million cubic feet, was last year reduced to under 10s.; and it is expected that during the present year this figure will be still further reduced. Unaccounted for gas has reached the low figure of 1·6 per cent.—it having been as high as 8·4 per cent. two years ago. Another favourable feature is the increasing demand for prepayment meters. There are now more than 2000 of these in use in the Company's district; while a brisk business continues to be done in gas fires and cookers. The report was adopted, and the usual dividends of 5 per cent. upon the consolidated stock and 3½ per cent. upon the shares (making with the interim dividends 10 per cent. on the stock and 7 per cent. on the shares for the year) were declared.

INCANDESCENT GAS LIGHTING IN ISLINGTON.

Lighting the Side Streets.

At the Meeting of the Islington Borough Council on the 6th inst., the Joint Finance and Lighting Committees presented the following report with reference to the proposed installation of incandescent gas in the side and back streets of the borough:—

Pursuant to your reference of the 16th of January last, we have had under consideration the letter from the Gaslight and Coke Company, dated Jan. 13, in which, after pointing out the advantages of street lighting by incandescent gas, and mentioning several districts which are so lit, they make the following proposals: (1) To adapt the 4270 street-lamps which are at present lit by means of ordinary gas-burners in the back and side streets of the borough with Windsor wind-proof lanterns, Sugg burners, mantles, and all apparatus necessary for incandescent lighting, at a cost of £2 2s per lamp. (2) To advance to the Council the capital sum of £8697 (the outlay required to pay for the installation) on the condition that it shall be repayable by quarterly instalments in from four to five years without interest. (3) To supply gas to such lamps at the present current rate—viz., £2 0s. 6d. per lamp per annum. (4) To maintain the lamps and burners and to renew the mantles and apparatus, and to light, extinguish, and clean such lamps, at £1 8s. 6d. per lamp per annum.

We have viewed the districts referred to by the Company as being lit by incandescent gas-lamps in the way they suggest the side and back streets of Islington should be lit, and have also obtained from the Local Authorities of the districts their views upon the lighting in question. We formed the opinion from our view that, as a street illuminant, the lighting of the streets by incandescent gas is extremely satisfactory; and our opinion is confirmed by the returns received from the Local Authorities of the districts we visited (most of whom had availed themselves of similar offers by the Gaslight and Coke Company), who informed us also that the system works well. We have, however, after consulting the Borough Engineer, come to the conclusion that the Company's proposals can with advantage be modified by substituting 17-inch Westminster pattern lanterns and Welsbach-Kern (No. 4) burners without pilot lights for the Windsor lanterns and Sugg burners proposed by the Company, the more so as we understand that the Company would be willing to adapt such lanterns and burners at £1 19s. 11d. instead of £2 2s. per lamp (the cost of Windsor lamps and Sugg burners), while the cost of the gas consumed by such burners would be somewhat reduced.

If the Company's proposals as modified by us are accepted, it will mean that the 4270 gas-lamps in the side and back streets of the borough will cost for gas, lighting and extinguishing, cleaning, maintenance of lanterns and burners, and renewal of mantles, apparatus, &c., approximately £14,216 per annum. The cost of gas, lighting and extinguishing, cleaning, maintenance, and repair to the existing lamps and columns was, for the year ended Lady Day, 1902, £16,068; but as this included the gas supplied to 219 incandescent lamps in addition to the 4270 before mentioned, and also repairs to columns and lanterns, it is difficult to institute an exact comparison. The sum to be provided annually to meet the cost of the installation will be, supposing that the repayment is spread over five years, about £1700 per annum.

Having regard to the very satisfactory character of the light in question, which would practically result in increasing the lighting of the back and side streets of the borough from 59,780 candles to 341,600 candles, and to the recognized fact that such streets cannot, with due regard for economy, be lighted by electricity under present circumstances, we have come to the conclusion that the offer of the Company, as contained in their letters to the Town Clerk and Borough Engineer, should, with certain modifications, be accepted.

We therefore recommend that, subject to the Finance Committee submitting an estimate in accordance with Standing Order No. 12, an agreement be entered into with the Company upon the following terms

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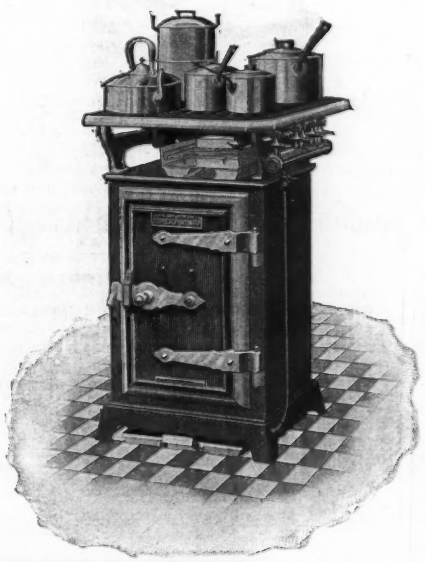
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and conditions: (1) That the Gaslight and Coke Company supply and fix 17-inch Westminster pattern lanterns with Welsbach-Kern (No. 4) burners, mantles, and all other apparatus connected with incandescent gas lighting, to the 4720 lamps in the borough, at £1 19s. 11d. per lamp. (2) That the cost of such installation, amounting to £8522 or thereabouts, be provided in the first place by the Company, and that the Council repay the same, without interest, by equal quarterly payments spread over five years, commencing from Midsummer Day, 1903. (3) That the Company undertake to supply gas to such lamps at the current rate for street lighting. (4) That the Company undertake to maintain the lamps and burners, to renew the mantles and apparatus, and to light and extinguish and clean such lamps, at a rate not exceeding £1 8s. 6d. per lamp per annum.

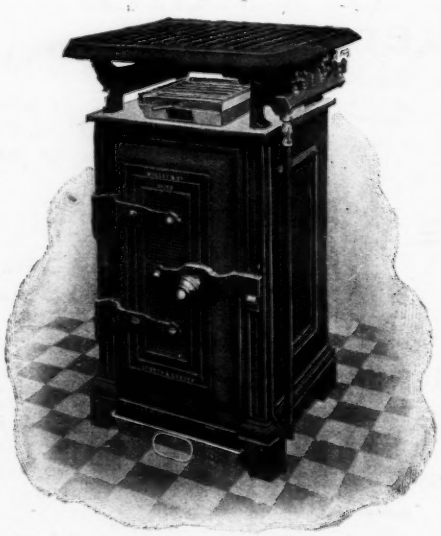
It was decided that the consideration of the recommendations should be adjourned to the next meeting of the Council. This was held last Friday, when, after some discussion, the first three recommendations were passed. The consideration of the fourth was adjourned, in order to allow a small difference (1s. per lamp) to be settled with the Company.

PUSHING BUSINESS AT LONG EATON.

Early last year, we took occasion to refer to the methods adopted by Mr. G. Stevenson, the Manager and Secretary of the Long Eaton Gas Company, to stimulate the consumption of gas in his district; and we ventured to remark that if the output did not increase dnring the year it would not be his fault. The Company held their annual meeting a few days ago, when the Directors reported that the augmentation in the business during 1902 had been the largest on record; and that it was due principally to the extended use of gas engines and cookers, slot-meter installations, and the general growth of the town and neighbourhood. One of Mr. Stevenson's methods may be commended to the attention of other managers. He not only induces people to have a gas-stove, but sends round a qualified lady to teach them (especially those of the artisan class) how to use it to the best advantage. His handbills showing what a pennyworth will do in the way of lighting, heating, cooking, and the supply of power, and especially what six pennyworth will accomplish in the production of light, as compared with electricity, are very attractive, and appeal at once to the eye and the pocket of the householder and man of business. The outcome of Mr. Stevenson's efforts has been, as his Directors acknowledge, a "record" increase in the sale of gas. This will be apparent from the following figures. In 1899, the total quantity of gas sold was 64,263,500 cubic feet, or 9·7 per cent. more than in the preceding year. This percentage refers, of course, to the total; but in the summer months (June to October) the increases were very marked —ranging from 10·66 to 18·63 per cent. In 1900, the sales amounted to 69,326,300 cubic feet, or 7·7 per cent. advance on the previous year; in 1901, they were 78,547,300 cubic feet, or 13·3 per cent. more than those of 1900; and last year they rose to 94,938,000 cubic feet, or 20·6 per cent. beyond 1901. The monthly consumptions showed very marked increases compared with the year 1899. Of the 94,938,000 cubic feet of gas sold, 63,978,200 cubic feet passed through ordinary meters, and 19,099,900 through prepayment meters. The total revenue amounted to £16,787, and the expenditure to £13,220; leaving a balance of £3567 to go to the profit and loss account. The sum available for distribution was £2795, and dividends were declared of 3½ per cent. on the "A" stock (making, with the interim dividend, 6 per cent. for the year), and at the rate of £4 14s. 6d. per cent. per annum on the "B" stock. A sum of £300 was added to the reserve fund, and the balance was carried forward. It may be confidently expected that the advance shown above will be continued in the present year; the Directors having, by means of discounts for prompt payment, made a considerable reduction in the price of gas. When referring to the business methods of the Company last year, it was mentioned that, in order to extend and encourage the use of gas for power purposes, the Directors had decided, as from the 1st of January, to reduce the price of gas used in engines to a uniform rate of 2s. 5d. per 1000 cubic feet net. It may be again pointed out that this is a very low rate for coal gas having the high calorific value of that supplied at Long Eaton, and it is undoubtedly an exceedingly cheap source of power. For motive purposes it is equal to electricity at about ½d. per unit; while for generating current for lighting, the cost for gas alone is less than 1d. per unit. We may add that Mr. Stevenson has devised a new method of lighting lace factories on the high-pressure incandescent gas system, and it has been adopted in three establishments, while trial installations have been fitted up in four more. We hope shortly to give some particulars of the system.

SALES OF STOCKS AND SHARES.

At the Mart, Tokenhouse Yard, last Wednesday, Mr. Alfred Richards sold stocks and shares in several Suburban and Provincial gas and water undertakings. The first lots offered consisted of £100 parcels of consolidated ordinary stock of the Lea Bridge District Gas Company, ranking for a standard dividend of 5 per cent., subject to the sliding-scale; the last dividend having been at the rate of 6 per cent. per annum. Two of the ten lots fetched £121 each, and the rest £120 apiece (an average of £120 4s.); the yield to the investor being £4 19s. 10d. per cent. The next five lots were consolidated "C" stock of the Croydon Commercial Gas Company, ranking for a standard dividend of 7 per cent., subject to the sliding-scale. Since June 30, 1894, the dividends have been at the rate of 9 per cent. per annum, and since Midsummer, 1898, they have been paid free of income-



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tax, which, in view of the present rate of the tax, is equivalent to £9 10s. 6d. per cent. per annum. Taking into consideration the price now charged for gas, the Company are entitled to distribute on the "C" stock a dividend at the rate of 10½ per cent., if earned. Four of the lots fetched £192 each, and the remaining one £190, or an average of £191 12s; the yield to the investor being £4 13s. 11d. per cent. Some £10 shares (7 per cent.) in the Lowestoft Water and Gas Company, the last dividend on which was at the rate of 5¼ per cent. per annum, were next put up, and were sold for £12 each *cum div.*, returning the purchaser £4 7s. 6d. per cent. The next lots consisted of some converted stock of the Hastings and St. Leonards Gas Company, ranking for a standard dividend of 3½ per cent., subject to the sliding-scale; the last dividend having been at the rate of 5 per cent. per annum. They were sold at the rate of £101 per £100 of stock, yielding £4 19s. per cent. The remaining parcels comprised some £10 ordinary shares in the Worthing Gas Company, on which 7 per cent. has been paid for many years; and £1070 of original stock of the City of Ely Gas Company, Limited, the dividend on which has stood at 8 per cent. for a long time. The shares were placed at an average of £14 3s. 6d. each, which returned £4 18s. 9d. per cent.; and the stock fetched an average of £160 10s. 8d. per £100, yielding £4 19s. 7d. per cent. The next day, Mr. T. Merry sold, by order of Executors, some "A," "D," and "E" shares in the Northampton Gas Company. The "A" shares fetched £43 each; the "D" shares, £9 10s. and £9 12s. 6d. each; and the two "E" shares offered realized £32.

ELECTRIC LIGHTING NOTES.

Ignoring the Ratepayers at Swindon.

The electric light has just been installed in the Workhouse of the Swindon and Highworth Union under rather singular circumstances. Some time ago the Swindon Gas Company offered to lay mains up to the Workhouse—a distance of a couple of miles or more—if the Board of Guardians would bear the cost of fitting up and lighting the House. This they agreed to do, and spent about £200 on the work. The gas-light was regarded as a great improvement; but then came the introduction of the electric light at Swindon, and the Corporation offered to supply the Workhouse. The Guardians, however, declined. Yet almost in the same breath they decided to have electric light plant of their own; and the Workhouse has been fitted, at a cost of about £2000, which, of course, the ratepayers will have to bear, without having been consulted on the matter.

A Risky Scheme Sanctioned for Faversham.

The Faversham Town Council have received from the Local Government Board their sanction to the borrowing of £23,779 for the purpose of installing a system of electric light, the money to be repaid in 25 years, or in a longer term if applied for. The matter came before the Council at their meeting last Tuesday, when Alderman Child drew attention to the very short time allowed for the repayment of the loan. Instead of 25 years, it should, he said, have been 50. They really ought to pass a resolution asking the Board to take into account the size of the town and the great amount of the present debts, and point out to them the desirability of extending to 50 years the period of repayment. He trembled at the thought of electric light in their town. Nine months ago, in comparative ignorance, he had voted for it; but after studying the matter more deeply, he felt he could not vote again for it. He was afraid that electric light would be a disastrous thing for Faversham for many years to come. Mr. Packer asked as to the kind of lamp to be used in the public lighting; and the Deputy-Mayor (Alderman Austin) replied that provision had been made for five or six arc lamps, while all the rest would be 16-candle incandescent lights.

Some Welsh Lighting Schemes.

Applications having been made to the Board of Trade by the Caerphilly, Llantrisant, and Bedwellty Urban District Councils for Provisional Orders to enable them to supply electric current in their respective districts, the matter was inquired into last Wednesday by the Hon. T. Pelham. There was considerable opposition from some of the large undertakings in the neighbourhood. Mr. E. Moon, K.C., appeared for the Councils of the two first-named places; and Mr. Ackworth represented the Bedwellty Council. Mr. Moon said that the Order had been applied for by the Caerphilly Council to enable them to become the lighting authority in the whole of the area subject to their jurisdiction; but there was no present intention of lighting it, as only certain portions required light. The area of the Council's territory was 14,426 acres; but a large portion of it was mountainous, and was only sparsely populated. There were 17,613 people in the entire area; but those to be immediately supplied under the scheme would be much less. They proposed to guarantee a minimum of 50,000 units; and 1000 lights would give them the revenue they required, which was a mere nothing. The scheme was put forward not only as a commercial enterprise, but as being necessary for the welfare of the community. The Llantrisant scheme would cover an area in which there were 10,000 people, who had no public lighting. The cost of the scheme would be £10,000. Mr. R. H. Fletcher, the Councils' Consulting Electrical Engineer, said a provisional arrangement for the supply of energy was being discussed with the South Wales Power Company, the price being 1½d. per unit, including the cost of transforming. The Caerphilly Council would have to provide the building and mains, &c., at an estimated cost of £6770. There were 132 public lamps to be supplied, and these, with the addition of a minimum of 1000 private lamps, would provide sufficient revenue. In the Llantrisant district there were 130 public lamps and 1480 private lamps estimated as necessary to provide adequate revenue to meet the working expenses of the scheme. In cross-examination by Mr. Noble, who appeared for three Railway Companies, witness said he knew of no scheme that was

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10 Gallon ..	2 ,, 10 ,, ..	1 ,, 11 ,, ..	1 ,, 10½ ,,
2 Gallon ..	2 ,, 10½ ,, ..	2 ,, 0 ,, ..	1 ,, 11½ ,,

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worked with 2000 lamps. It was proposed to sell to the consumers at 6d. per unit, and the total cost to the Councils would be 4·74d. per unit. He admitted he had not included any figures for maintenance. Other evidence having been given in support of the applications, Mr. R. Hammond was called by Mr. Noble in opposition. He declared that the Llantrisant scheme, with a consumption of only 50,000 units, could not possibly pay, and must inevitably result in a call of at least 6d. in the pound upon the rates. The idea of spending £10,000 on a 50,000 unit scheme in such a district, where the administration charges must necessarily be high, would not be at all in accordance with good practice. Mr. Cornelius Lundie, General Manager of the Rhymney Railway Company, said that in the Caerphilly urban district his Company paid one-fifth of the whole rate; and he opposed the scheme on the ground that, in his opinion, it would not prove remunerative. He thought the Bermondsey clause should be inserted in the Order. Mr. Rhys Williams, who appeared for Lord Windsor, strongly urged the inclusion of this clause, and also one making it obligatory upon the Council to take their power from the South Wales Company. Speaking for the Barry Railway Company, Mr. John Sankey, on behalf of the Rhymney and Aber Valleys Gas and Water Company, said it was preposterous to think that colliers would go in for a luxury light. If the scheme was going to be a success, the suggested clause could not possibly hurt the promoters. Mr. Noble also asked that his clients should be protected by the insertion of the clause. Mr. Moon, in reply, said that in these cases the governing factor was that both Caerphilly and Llantrisant required some form of light. The schemes were promoted in the interests of the community, and they had practically the unanimous assent of the ratepayers. This closed the inquiry in respect of those places; and the application of the Bedwellty District Council was gone into. Among the parties represented in opposition were the New Tredegar and District Ratepayers' Protection Association, the Powell Duffryn Steam Coal Company, Limited, the New Tredegar Gas and Water Company, the Rhymney and Aber Valleys Gas and Water Company, and the Tredegar Iron and Coal Company. Mr. Ackworth said the Bedwellty Council would have no objection to the insertion of a clause prohibiting them from putting up a generating station; but the Bermondsey clause would cripple the promoters. The proposed capital outlay under the scheme would be £7000, and there would be an annual expenditure of £1482. The energy would be supplied by the South Wales Power Company; and a consumption of 116,000 units was anticipated, with a revenue of £1803. Mr. Noble opposed the application on behalf of undertakings representing an aggregate rateable value of £28,572, out of a total of £32,783 for the district, and witnesses were called in support. The inquiry then closed.

At the weekly meeting of the London County Council last Tuesday, the tender of Messrs. Parkinson and W. & B. Cowan, Limited, amounting to £1675, was accepted for the supply of new testing apparatus required in consequence of the extension of the Westminster gas-meter testing-office.

EAST LONDON WATER COMPANY.

Half-Yearly Report and Accounts.

In the report to be presented at the meeting of the above-named Company on the 2nd prox., the Directors announce an increase of £2608 in the water-rates during the six months ending the 25th of December; the number of new services laid on being 3182, against 3637 in the corresponding period of 1901, bringing up the total to 221,235. Owing to the small rainfall, 1661 million gallons of water had to be purchased from other Companies, in order to ensure a constant supply throughout the whole of the district. The cost of this water was £24,614, which has been charged to revenue. Under the supervision of the Company's Engineer (Mr. W. B. Bryan, M Inst.C.E.) all the pumping machinery and works have been maintained in effective condition. Good progress has been made with the construction of the two new storage reservoirs; and it is hoped that they will be handed over by the Contractors at the close of next month. Reference is made to the passing of the Metropolis Water Act, 1902, the provisions of which are considered to be, on the whole, calculated to secure an equitable settlement as between buyer and seller. Certain amendments which the Directors deemed essential to safeguard the proprietors' interests were conceded by the Government. The accounts accompanying the report show that the revenue in the six months covered was £213,264, or £3921 more than in the corresponding period of 1901 There was, however, an increase of £7996 in the expenditure, chiefly for maintenance. In a note to the accounts the Auditors say: "Credit has not been hitherto taken for water in store in the reservoirs. There were 817 million gallons in store at the close of the half year, while the whole of the 1661 million gallons bought from other Companies, at a cost of £24,614 19s. 4d., is debited in the half year's accounts. We consider the cost price of the water in store a fair asset." The Directors recommend a dividend for the half year at the rate of 8 per cent. per annum, less income-tax.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners held on Monday last their statutory annual meeting, though it has nothing annual about it save the name. As a matter of fact, the business transacted was smaller than usual. The report of the Engineer brought out a make of gas during February of 191,533,000 cubic feet, and since May 16, of 1,581,561,000 cubic feet. For the portion of the financial year which has elapsed, the output has been 34 million cubic feet less than it was

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in the corresponding period of last year; and of this reduction no less than 20 million cubic feet was experienced during February. The wages in the carbonizing department at Granton are again phenomenally low, being only 1·99d. per 1000 cubic feet, as compared with 5·23d. in the old Edinburgh works. The Commissioners resolved to re-expose the Leith Gas-Works for sale by auction in one lot, at the reduced upset price of £24,000. Last time the works were exposed, the Commissioners asked £26,000; but there was no bid. It was reported that, in reply to a letter from the Secretary of the Edinburgh and Leith Branch of the Amalgamated Society of Engineers, complaining that men were being employed by the Commissioners to do engineering work at Granton who were not being paid at the Union rate of wages, the Works Committee had instructed the Clerk to write that the men referred to had made special bargains with the Commissioners as to the terms of their employment.

The only serious litigation which has arisen out of the scheme for the erection of new gas-works at Granton has been brought into Court. It is an action by the New Conveyor Company, Limited, of Smethwick, against the Commissioners, and concludes for payment of a sum of £2500, and for interdict of the use of the "shot-pouch" method of measuring coal and charging the inclined retorts at Granton. The record was closed by Lord Kincairney in the Court of Session last Tuesday; but the statements upon it are so far from being complete that I cannot give a full narrative of what is stated. I can go the length, however, of stating that the complaint of the pursuers is that the Commissioners have infringed letters patent No. 20,709, to which they now have right, which were granted on Nov. 16, 1892, to Ludovico van Vestrant and Maurice Graham for "improvements in charging inclined gas retorts;" and they claim the amount sued for as the loss which they have sustained by the use of their system of working. The Commissioners plead, in defence, that there is no infringement of the pursuers' letters patent, because the installation at Granton is not identical with that of the pursuers; and, further, that the pursuers' patent was anticipated. I understand that a long list of prior patents is submitted. The case has been ordered to go to proof on a day to be afterwards fixed, which, as the Court is in vacation, cannot now be done till May. I may state that the Commissioners have had ample notice of the claim which is embodied in the action, as the pursuers communicated with them as soon as they learned of the system of charging which was being erected at Granton, and that the Commissioners at once repudiated liability.

An extensive scheme of gas-works reconstruction is in progress at Newport (Fife), where the Corporation, having recently acquired the gas undertaking, are spending about £20,000 in the renovation of the works. It is expected that the new works will be completed in the beginning of June. Within less than two years, the Corporation have reduced the price of gas from 5s. 5d. to 4s. 10d. per 1000 cubic feet; and they are in hopes that they will be able to lower it to probably 4s. per 1000 cubic feet.

It is not often now that I get copy out of the doings of the Forfar Gas Corporation; but I have secured an item this week, in the action of the Town Council with reference to a proposed exhibition of gas appliances in the town. Messrs. R. & A. Main, Limited, of Glasgow and Falkirk, wrote asking for permission to hold an exhibition on the usual terms. This letter was read at a meeting of the Town Council on Wednesday; and then the extraordinary statement was made by Mr. M'Dougall, the Convener of the Gas Committee, that they had never had anything of the kind in Forfar. He was in favour of the proposal to hold an exhibition, and thought they could afford to spend £50 upon the purchase of gas-stoves, to found a department. This suggestion, modest though it was, did not find favour. One councillor thought "it would be wiser to wait" for more information. Another held that it would be throwing away the funds of the Corporation, and that if they started to be stove dealers they did not know where they would end—it would be competing with local shopkeepers. The flies on the carriage-wheel proved too much for the £50 energy which Mr. M'Dougall put into the business; and he was obliged to delay the matter for a month, "in order that inquiries might be made." This is instructive. A Corporation the members of which spend their time in quarrelling with each other, as was notoriously the case in Forfar for years, cannot find time also for genuine work, and are bound to fall behind in the march of events. So much is this the case in Forfar, that they have never yet given the community the opportunity of considering the advantages, both to the people themselves and to the gas undertaking, of cooking by means of gas; and, indeed, the councillors themselves are ignorant upon the subject.

In the "JOURNAL" for the 10th inst., it was stated that the sulphate plant at the Hamilton Corporation Gas-Works was doing excellent work. The cost of this plant has been £1835. It will be pleasant information to all to learn that the good working is largely due to the action of Mr. J. Ballantyne, the Gas Manager. It was stated by Bailie MacHale the other day that Mr. Ballantyne had made an invention in connection with the sulphate plant which would lead to an additional profit of £150 a year in the operation of it.

The special meeting of the Hamilton Town Council which I mentioned last week had been called for the purpose of rescinding the resolution to proceed with the construction of a railway siding into the gas-works, or, alternatively, for the arrangement that a poll of the ratepayers upon the subject should be taken, was held on Monday. Provost Keith presided. He ruled incompetent the part of the requisition which called upon them to rescind their resolution, but allowed the proposal that a *plébiscite* of the ratepayers be taken to be laid before the meeting. This was done by Mr. Cassells, who is the champion of the opposing party, and has been made so, apparently, in virtue of his having at one time been a railway servant. Mr. Cassells' stock argument is that, on account of the heavy gradient upon the railway, it will be necessary to drive trains over a level crossing at a rate of from 10 to 15 miles an hour, which would be a source of great danger to the community. Provost Keith opposed the proposal. There was not, he contended, sufficient division of opinion in the Council to justify

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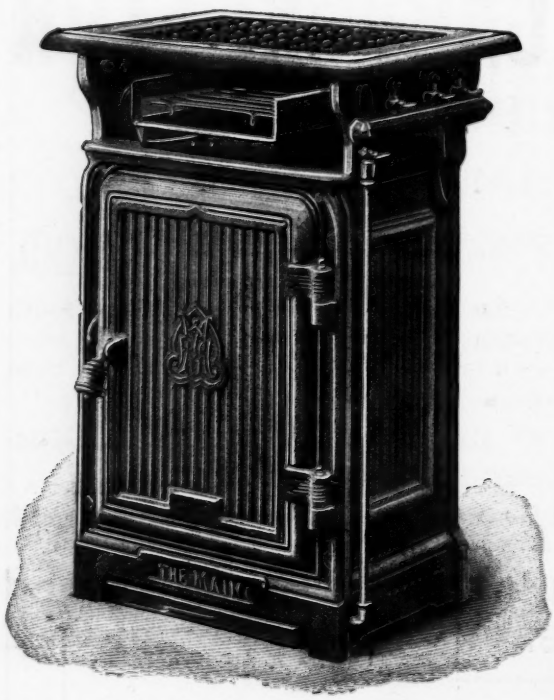
BELL BARN ROAD, BIRMINGHAM.

a reference to the electorate. The decision of the Council had been arrived at after a fair, full, unprejudiced statement of all the facts of the case. He complained that there had been misrepresentation on the other side. As to the rate of speed of trains, he said they had the assurance of the Engineer to the Railway Company that it would be from 3 to 5 miles an hour, which would not be dangerous to anyone. The commercial advantage of the scheme would be a profit of from £200 to £400 a year. The Council, by eight votes to six, rejected the motion for a poll. This settles the matter so far as the Council are concerned; but it has now got into the public prints, in which letters to the Editor are appearing in shoals. I will only mention one of them, that by Mr. W. Ewing, of Greenock (late of Hamilton), who writes to contradict a statement made by Provost Keith at a public meeting to the effect that the railway siding was one of the pet schemes of Mr. Ewing. Mr. Ewing says it was not, and that local supplies of coal could be delivered into the gas-works cheaper than they could be by a railway siding; and that so long as the local pits could supply the demand, it never was his intention to alter the inexpensive method of coal handling in use.

To turn now to Falkirk, where much the same question—the interference of electors with the decisions of the Town Council—is to the front at present, I have to report that this week has seen a good deal of action, though probably not much progress, in the matter of the new gas-works. The subject came before the Town Council in the minutes of the Special Committee who are responsible for the throwing over of the Thornhill site and the reversion to the site at Parkhouse. In the first place, the Committee instructed the Manager to report as to the cost of cartage and of connecting the gasholder at Parkhouse to works upon either site. This was agreed to, after a discussion in which some of the councillors expressed themselves as against the introduction of Thornhill again into the subject for consideration, seeing that it had been shelved. The majority, however, professed that they wished it included in the return, "to satisfy the other side." But the most important part of the business was the reading of letters from Mr. T. Wilson, of Coatbridge, in the first of which Mr. Wilson expressed his willingness to accept the position of Consulting Engineer, but demurred to the condition that he should only get the appointment if the Council received a favourable report from the firm of architects who are to be consulted as to the suitability of the ground at Parkhouse for the foundations of a gas-works. He suggested that the Consulting Engineer should have an opportunity of inspecting the sites, because, to use his expressive language, "the Consulting Engineer, being the responsible party, would suffer in his reputation for all time coming should the works be placed on an unsuitable site." What reply was sent to Mr. Wilson I do not know; but four days later he wrote accepting the position, and assuring the Council that nothing would be wanting on his part to make everything a success. It may thus be assumed that the obnoxious condition has been withdrawn. After disposing of the minutes of the Special Committee, the Council took up the consideration of the resolutions adopted at public meetings of electors, protesting vigourously against the erection of gas-works at Parkhouse. These resolutions the Parkhouse party characterized as having been carried by meetings which were dominated by the Falkirk Iron Company, in whose interest, it was believed, the site at Thornhill, with its railway connection, had been selected. This idea was condemned by more than one speaker, and at the end of a long discussion the Council took the view—certainly a sensible one—that the resolutions were entitled to be received with respect, and that they will consider them when they receive the report as to the site.

I have already called attention to the curious situation which has arisen at Airdrie. The Town Council have long wished to acquire the undertaking of the Airdrie Gas Company. After many delays, they resolved, in January last, to adopt the Burghs Gas Supply Acts, with a view to promoting a transfer; and everything bade fair to the proposal being carried through. But it has been discovered that Airdrie is within the area of supply of the Coatbridge Gas Company, which is a Company incorporated by Act of Parliament, and therefore possessing statutory powers. On Feb. 7, the Company despatched a letter to the Town Clerk of Airdrie pointing this out. A letter asking explanations appears to have been sent in reply, because at a meeting of the Town Council on Tuesday last a letter from Mr. T. Wilson, the Manager of the Coatbridge Gas Company, was submitted, in which he said: "You inquire whether the Coatbridge Gas Company intend to supply the inhabitants of Airdrie with gas, and, if so, on what terms; and, if not, what was the object of our letter of the 7th ult. In reply, I am instructed to say, as to the intention of the Company regarding the supply of gas to Airdrie, that the only answer the Company can give to such a question is that they are not at liberty to relinquish any of the power they possess; and that they are prepared—or, indeed, they are bound—to exercise the whole powers imposed on them by their Acts of Parliament. As to terms, these, in our extended area of supply, would probably be the same as in the area presently supplied. The object of our letter was not unfriendly. It was written for the purpose of directing the attention of the Town Council to a view of matters which my Directors were afraid was being overlooked by your Council. . . ." This letter will doubtless lead to the abandonment of the proposal for a transfer; but what does it mean beyond that? Are the Coatbridge Gas Company going to take over the Airdrie Company, or to oust them as being practically squatters?

At a meeting of the Greenock Town Council on Tuesday, Mr. W. Ewing, the Gas Manager, reported upon plant which is wanted for the gas-works. He recommended the erection of a scrubber-washer of the capacity of 125,000 cubic feet per hour, with tar-extractor to work in conjunction with the existing scrubbers, or separately, at a probable cost of £1400; and the provision of six purifiers, 40 ft. by 30 ft. by 6 ft., with stage-floor house, elevators, and railway connections, at a probable cost of £8278. These were agreed to; the Manager being instructed to draw up specifications for the work. Some other recommendations by the Manager were held over meanwhile. The yield of gas per ton of coal is 10,391 cubic feet, as compared with 10,036 cubic feet a year ago.



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Both figures are high; but the latest is the highest, which shows a continued good record at Greenock.

The Arbroath Gas Corporation are apparently experiencing some little difficulty in collecting their outstanding accounts, no fewer than 58 cases at their instance having been called in the Sheriff Small Debt Court on Wednesday. Mr. William Robertson appeared on behalf of the pursuers; and in 55 cases he was granted decree in absence. Three cases were defended. In two of these, the Sheriff granted decree for the amount sued for; while in the other, in which prescription was pleaded, the case was referred to the oath of the defender, and he swore that he did not owe the account. The case was accordingly dismissed.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March* 21.

Sulphate of Ammonia.

There has been no pause in the upward movement, every parcel offered being keenly competed for and the closing quotations being £13 2s. 6d. to £13 5s. per ton f.o.b. Hull, and £13 5s. to £13 7s. 6d. per ton f.o.b. Liverpool and Leith. The Continent has been for the most part silent; but from other points there has been a fair amount of direct buying. Otherwise the supply has been taken for covering contracts. For April and May, prompt prices have been paid readily, but for June something less would have to be accepted. July-December f.o.b. Leith has been sold at £12 7s. 6d. per ton, and at the close makers require £12 10s. per ton.

Nitrate of Soda.

This article is very firm at 9s. 3d. to 9s. 4½d. per cwt., according to quality, but so far no serious attempt has been made to advance prices further. Probably holders are awaiting the March returns of deliveries from the ports before making a move, remembering their unfortunate experiences last season.

LONDON, *March* 21.

Tar Products.

The markets are generally quiet with a decidedly downward tendency, which cannot be very satisfactory for the distillers who have taken the raw material at very high prices. Pitch is very quiet indeed, and for forward delivery prices are easier. There is a general impression that there will be a considerable falling off in the consumption next season, as fuel makers assert that it is impossible for them to produce briquettes at a profit unless there is a very great reduction in the price of pitch. As regards prompt delivery, the market is steady, but certainly easier than during last month. Benzol is very quiet indeed. Business is reported at 9½d. f.o.b. London for April; but for forward delivery there is very little business doing. An offer of 9d. for March-April is reported to have been accepted for a considerable quantity at an outport for export. There are now sellers of 50-90 per cent. at 8d.; but consumers do not take any interest in this quality. In toluol, a small sale is reported at 7¼d. f.o.b. London; but business is very limited. The position of anthracene remains unchanged. In solvent, there is absolutely no business to report. Distillers in the North are offering at very low prices for export, but are unable to arrange business. Foreign consumers are evidently obtaining their supplies without taking any from England. Crude carbolic continues in good demand. There is still a considerable inquiry at 1s. 6d. for prompt delivery; but consumers will not exceed this price, whereas makers as a rule ask 1s. 7d. for March-June. Crystals are in fairly good demand; but the English makers quote higher prices than consumers are willing to pay. Creosote is, if anything, a little easier. There is certainly more offering in both London and the provinces, especially for early delivery.

The average values during the week were: Tar, 23s. to 28s. Pitch, London, 58s. to 58s. 6d.; east coast, 55s. 6d. to 56s. 6d; west coast, 53s. 6d. to 55s. Benzol, 90 per cent., 9¼d. to 9½d.; 50-90 per cent., 8d. Toluol, 7d. to 7⅓d. Crude naphtha, 3¼d.; solvent naphtha, 8½d. to 9¼d.; heavy naphtha, 9d. to 10d. Creosote, London, 1⅛d. to 1⅜d.; North, 1¼d. to 1$\frac{5}{16}$d. Heavy oils, 2d. to 2⅛d. Carbolic acid, 60 per cent., 1s. 6d. Naphthalene, 35s. to 55s.; salts, 25s. to 27s. 6d. Anthracene, "A" quality, 1⅝d. to 1¾d.; "B" quality, 1d. nominal.

Sulphate of Ammonia.

The market continues very firm, and there is a strong demand, especially for prompt delivery. Beckton quote £13 2s. 6d. for May; but are not offering anything for earlier delivery. Another large London Gas Company sold early in the week at £13 3s. 9d., but later on realized £13 5s. for prompt shipment. In Leith, there is still a strong demand, and business is reported at £13 5s. for early shipment. In Hull, business has been done at £13 for April; and in one instance the same price was paid for May shipment. In Liverpool there is a strong demand, especially for prompt shipment, and £13 has been paid in more than one instance; while it is reported that makers now ask £13 5s. for immediate shipment.

COAL TRADE REPORTS.

Lancashire Coal Trade.

The position with regard to business generally throughout the coal trade of this district remains without material change from last week. With varying weather, there is some fluctuation in requirements for house-fire qualities, but nothing like the average demand for the time of the year; and pits continue on a very restricted output—full time being quite exceptional, and three to four days per week about the general average. Quoted pit prices in the Lancashire district are without alteration; and at present there is no talk of any official reduction. The easing down in prices at many of the collieries

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in the Yorkshire district during the month, and the large accumulation of stocks in the Derbyshire district (which there is a tendency to push on the market at lower figures), have, however, a weakening effect; and in outside markets, local collieries, where they hold to their full rates, are losing business owing to underselling from other quarters. This condition of things cannot, of course, continue indefinitely; but for the present, quotations, although perhaps not firm at the maximum rates, remain at about 14s. to 15s. per ton for best Wigan Arley, 12s. 6d. to 13s. for the lower qualities of Arley and Pemberton four-feet, and 10s. to 11s. for the common descriptions of house-fire coals. The lower classes of round coal used for steam and forge purposes, although indirectly affected by the large surplus supplies of common house-fire coal on the market, remain steady at about late rates. There is, however, weakness in prices where quotations are made for clearance quantities for shipment. Quotations are now being sent out for gas coals in connection with the renewal of a number of important contracts for the ensuing year. So far, Lancashire collieries are not quoting below the reduced basis rates which had to be accepted for gas coal contracts last year; but it is too early to express any definite opinion as to how prices will rule when business comes to be actually settled. The outlook of the market would, however, seem to be in favour of the buyers; and no doubt considerable negotiation will be necessary before important contracts are concluded. As regards steam and forge coals, a moderate business is being put through, with prices maintained at about 8s. to 8s. 3d. for ordinary descriptions, up to about 8s. 9d. for better qualities at the pit. For shipment, prices are still cut extremely low—unscreened coal being obtainable at 8s. 3d. to 8s. 9d. per ton, and common screened steam coal from 9s. 3d. to 9s. 6d., with good qualities quoted at 10s., delivered at the ports on the Mersey. General firmness is maintained with regard to engine fuel—not so much owing to any large demand, but to the present restricted production of slack. On forward contracts, there is a tendency to stiffen on current rates; but any actual advance is scarcely being got. At the pit-mouth, best qualities remain very firm at 6s. 6d. to 7s. per ton, medium sorts 5s. 6d. to 5s. 9d., with the commoner descriptions ranging from 4s. 3d. to 4s. 9d.

Northern Coal Trade.

The coal trade is still quiet; and there is a moderate demand for some classes of fuel. The shipments are rather better than during the stormy weather; but there is still a lessened export, owing to the falling off in the demand for the United States. This affects the steam coal trade most; but the price is not much altered. Best Northumbrian steam coals are 10s. to 10s. 3d. per ton f.o.b., second-class steams are quiet at 9s. to 9s. 3d., and steam smalls are steady at 5s. 6d. to 5s. 9d. In the gas coal trade, one or two contracts are under discussion, both local and for export; but the quantities are not very large. It seems to be expected that for the Continental tenders rather low prices have been quoted, as the competition with the German coals is for these contracts very keen at the present time. For occasional cargoes of Durham gas coals, the price varies from about 8s. 3d. to 8s. 10½d. per ton f.o.b., according to quality; but such sales are not very numerous at present, as some of the gas companies have full stocks of coal accumulated. The price of gas coke varies, f.o.b. at Newcastle, from 12s. 6d. to 13s. per ton; and the demand is fairly good at present.

Scotch Coal Trade.

Quietness still continues; there being, in fact, in many cases difficulty in disposing of the output. Prices do not show much difference, however, the season being a dead one, waiting for the opening of the Baltic ports. The prices quoted are: Main 8s. 3d. to 8s. 6d. per ton f.o.b. Glasgow, ell 9s. to 10s, and splint 8s. 9d. to 10s. The shipments for the week amounted to 187,980 tons—a decrease of 3067 tons upon the previous week, but an increase of 12,994 tons upon the corresponding week of last year. For the year to date, the total shipments have been 1,863,366 tons—an increase of 66,436 tons upon the same period of last year.

A Water-Works Arbitration at Yarmouth.—An arbitration has recently been held, before the Sheriff of Norfolk and a Special Jury, between the Great Yarmouth Water-Works Company and Sir Edmund Lacon. The case was in respect of land at Great Ormesby, adjoining the premises of the Water Company, which they were desirous of acquiring. The amount claimed by Sir E. Lacon was £9707. In the result, the Jury awarded a sum of £2678 in full settlement.

Walker and Wallsend Gas Company's Bill.—At a public meeting of the ratepayers of Willington Quay, held to consider the advisability of opposing the Bill being promoted in Parliament by the Walker and Wallsend Union Gas Company, the Chairman of the District Council (Mr. W. C. Watson), who presided, said that the Council had resolved to oppose various clauses which would considerably affect Willington Quay. Mr. Bolam explained that the Company had taken forty years to spend a capital of £100,000. They now proposed to raise another £200,000; and it might be thirty years before they went to Parliament again to get fresh powers. It was only at a time like the present that they had a chance of obtaining better terms for the community. The Council desired a reduction in the standard price of gas, and the Company had already offered a penny; but this was not considered sufficient. Then it was proposed by the Company that the illuminating power should be reduced from 15½ to 14 candles; and this was a strong reason for the Council desiring a reduction in the price. There should be a clause enabling the Council to discontinue the use of gas if at some future date they thought fit to do so. They did not know what advances electricity might make in the next twenty years. Some discussion followed; there being manifested a spirit of opposition to the Council's proposal. Eventually a vote was taken, when eleven hands were held up in favour of the resolution authorizing the Council to oppose the Bill, and eighteen against it. A poll was demanded. At a similar meeting of the ratepayers of Wallsend, the proposal that the Town Council should oppose the Bill was agreed to.

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WINDSOR ST. WORKS, BIRMINGHAM	2,000,000	KINGSTON, PA.	125,000	TONBRIDGE	300,000
SALTLEY WORKS, BIRMINGHAM	2,000,000	PETERBOROUGH, ONT.	250,000	STRETFORD	500,000
COLCHESTER	300,000	WILKESBARRE, PA.	750,000	OLDBURY	300,000
BIRKENHEAD	2,250,000	ST. CATHERINES (Second Contract)	250,000	TODMORDEN	500,000
SWINDON (New Swindon Gas Co.)	120,000	BUFFALO, N.Y.	2,000,000	SALTLEY, BIRMINGHAM (Third Contract)	2,000,000
SALTLEY, BIRMINGHAM (Second Contract)	2,000,000	WINNIPEG, MAN.	500,000	YORK (Second Contract)	750,000
WINDSOR ST., BIRMINGHAM (Second Contract)	2,000,000	COLCHESTER (Second Contract)	300,000	ROCHESTER (Second Contract)	500,000
HALIFAX	1,000,000	YORK	750,000	NEWPORT (MON.)	250,000
TORONTO	250,000	ROCHESTER	500,000	TOKIO, JAPAN	1,000,000
OTTAWA	250,000	KINGSTON, ONT.	300,000	PERNAMBUCO (Brazil)	125,000
LINDSAY (Remodelled)	125,000	CRYSTAL PALACE DISTRICT	2,000,000	MALTON	150,000
MONTREAL	500,000	DULUTH, MINN.	300,000	DULUTH, MINN. (Second Contract)	300,000
TORONTO (Second Contract Remodelled)	2,000,000	CATERHAM	150,000	BROCKVILLE (ONT.)	250,000
BELLEVILLE	250,000	LEICESTER	2,000,000	SMETHWICK	500,000
OTTAWA (Second Contract)	250,000	ENSCHEDE (HOLLAND)	150,000	GRAVESEND	300,000
BRANTFORD (Remodelled)	200,000	BUENOS AYRES (RIVER PLATE CO.)	700,000	NEWPORT, MON. (Second Contract)	250,000
		BURNLEY	1,500,000	TORONTO (Third Contract)	750,000
		KINGSTON-ON-THAMES	1,750,000		

Complete Gas-Works at NELSON, BRITISH COLUMBIA.

LEEDS, 1,200,000 C. Ft. LEICESTER (2nd Cont.), 1,000,000 C. Ft. NEWCASTLE-ON-TYNE, 1,800,000 C. Ft.
MONTREAL, ONT. (Second Contract) . . . . . 1,800,000 Cub. Ft.

Serious Gas Explosion at Longford.—Mr. J. Farrell, M.P. for North Longford, was last week the victim of a gas explosion, by which he was reported to have been somewhat seriously injured. He was superintending the repairing of a gas-engine in the office of the "Longford Leader," of which he is proprietor, when there was a sudden explosion. Mr. Farrell is said to have sustained very severe injuries about the face, more particularly the eyes, which were thought at first to have been permanently blinded.

The Triumph of Incandescent Gas Lighting at the Antipodes.—In connection with the article on the above subject which appeared in the "JOURNAL" last week, we learn from a letter received yesterday from a correspondent in Sydney that the Mayor of Enfield (the place mentioned last week), in his Minute to the Council on his retirement from the chair, said: "I am pleased that our streets are now lighted with gas, in lieu of the electric light. The gas is much cheaper, and the illumination about five times better."

Mr. Shadbolt on the Value of Gas.—In connection with a gas exhibition held last week in the Exchange Hall, Grantham, under the auspices of the Grantham Gas Company, Mr. R. G. Shadbolt, the Engineer and Secretary, delivered, on Thursday evening, an interesting lecture on "The Value of Gas for Lighting, Heating, and Power." He concentrated his attention mainly on a comparison of the results obtained from gas and electricity, and quoted a number of striking illustrations proving the superiority of the former on every point. He was listened to with much attention by a good audience, who accorded him, through the Chairman (Mr. J. G. Thompson), a very hearty vote of thanks. We shall reproduce portions of the lecture next week.

Morte Video Water-Works Company, Limited.—The report for the year 1902, presented at the ordinary general meeting of the Company last Thursday, shows an increase of £251 in the income, and a decrease of £819 in the working expenses; the net revenue being £58,270, against £57,198. After paying debenture interest and other charges, providing £3000 for depreciation on old meters, and placing £5000 to the depreciation fund, for the renewal of buildings, plant, &c., there remains an available balance of £39,613. An interim dividend of 2½ per cent. was paid on the 1st of November, and the Directors now recommend a further dividend of 2½ per cent. (making 5 per cent. for the year, free of tax); carrying forward £19,613.

Heavy Damages against the Welsbach Company in New York.—We learn from the "Financial News" that an inventor and manufacturer named Kaufman, formerly doing business in Manhattan, has sued the Welsbach Company in New York for false arrest and malicious prosecution. He informed the Jury that in 1900 the Company obtained an injunction against him, prohibiting him from continuing to manufacture mantles. They held that he was infringing their patent; but he denied it. In October of the same year, he alleged that the Company had him arrested on a criminal charge, that he was confined for six months, and was finally discharged; the Company failing to have the case against him called for trial. He obtained a verdict, with £20,000 damages.

New Water-Works for Rothwell.—The new water-works of the Rothwell Urban District Council were formally opened last week. The supply is obtained from the old Shotwell Mill, about 33 acres in extent, which cost, with the reservoir site, £3200. The yield is 120,000 gallons per day. The water is conveyed to a valve chamber, which regulates the supply to three softening tanks, each capable of holding 33,000 gallons. The reservoir has a capacity of 200,000 gallons. The old mill pond has been converted into a storage for emergencies, and it will contain 500,000 gallons. The pumping plant has been supplied by Messrs. G. R. Mather and Son, of Wellingborough. The cost of the work has been about £6350, which has to be repaid in 28 years; but the outlay for the land is to be liquidated in 50 years.

A Profit on the Halifax Gas-Works.—In explaining the estimates for the coming year at a special meeting of the Halifax Town Council on Wednesday, Alderman G. H. Smith stated that last year the Gas Committee came before them with a loss, for which there were special reasons, of a very considerable sum. During the present year, great efforts had been made to retrieve the position of the works; and it was gratifying to know that the Gas Committee had made a profit of £7319. For the coming year, a profit of £6000 was estimated; and he anticipated that it would be even more. The electricity works had made a profit of £2935, which had been placed to the reserve fund, for renewals, making the fund £7213. In connection with the water-works there was a deficiency of £7298. New reservoirs were in course of construction at Walshaw Dean; and it was necessary to levy a rate-in-aid of 4d. in the pound for these works, from which, of course, no income could be derived for some time.

South Holderness Gas and Water Supply.—The scheme of Mr. R. S. Emerson for the supply of Hedon with gas and water was the subject of an inquiry by Mr. Ingram B. Walker, one of the Inspectors of the Board of Trade, a few days ago, in reference to an application made to the Board by the promoter for a Provisional Order to give him the necessary powers. He proposes to raise capital of £18,000 for gas and not exceeding £12,000 for water; and he is moving in the matter on the ground that the district is not adequately supplied with either. The application was opposed by the Hedon Corporation, the Hedon Gaslight and Coke Company, and other bodies. The scheme was described as hopelessly impossible, because water could not be obtained in the area in quality or in quantity fit for the purpose; and, in addition, it was said to be financially unsound. Moreover, a supply of water would be obtainable from Hull as soon as ever terms could be arranged. Among the witnesses called for the opposition were Mr. F. J. Bancroft, B.Sc., the Water Engineer to the Hull Corporation, and Mr. J. Holliday, Assoc.M.Inst.C.E., F.C.S., the Engineer and Manager of the Sutton, Southcoates, and Drypool Gas Company. The chief points in the evidence given by the latter were: (1) That the present price charged for gas to consumers in Hedon and Preston by the Hedon Gas Company is reasonable; and (2) that the Company could, at a reasonable cost, on their present site, extend their works so as to enable them to manufacture 40 per cent. more gas than is at present required. These points could not be disproved by the promoters' Counsel.

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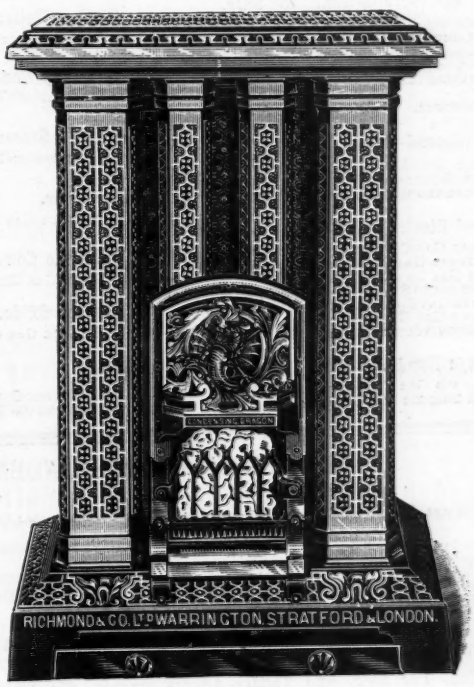

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GAS COMPANIES.

The efforts of the Directors of the Exmouth Gas Company to popularize the use of gas by means of stoves, fires, and prepayment meters, have been so successful, as shown by a gratifying increase in the sale of gas last year, that they propose to reduce the price from the 25th inst.; the reduction to take the form of a rebate of 5 per cent. (equal to 2d. per 1000 cubic feet) for prompt payment.

The Works Committee of the Southport, Birkdale, and West Lancashire Joint Water Board have been authorized to commence negotiations with Sir Tristram Tempest for the purchase of a strip of land, not exceeding four acres in extent, at Gorse Hill, as a site for an additional reservoir. The Board obtained powers in 1900 for compulsory purchase; but the time allowed for this will soon expire.

Last Tuesday tenders were opened for the £100,000 of 3 per cent. debenture stock which, as announced in our columns on the 10th inst., the Southwark and Vauxhall Water Company had decided on issuing, on terms that were advertised in a recent issue of the "JOURNAL." Applications at £94 and above received about 72 per cent. of the amount desired.

The Wellington (N.Z.) Gas Company, Limited, are contemplating a complete alteration of one of their retort-houses, including an installation of coal elevating and conveying machinery. The Company's Secretary (Mr. R. G. Howell) is expected to arrive in London in a short time, to make the necessary arrangements for the work to be carried out.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

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AGENTS FOR BRAIDED TUBING. Ambor, Hamburg.
ASSISTANT-MANAGER. Swindon United Gas Company.
CLERK AND BOOK-KEEPER. Colombo Gas and Water Company.
DRAUGHTSMAN. H. W. F., Drapers Gardens, London.
DRAUGHTSMAN. No. 4007.
DRAUGHTSMEN. W. J. Jenkins and Co., Retford.
JUNIOR CLERK. No. 4008.
STOKER. East Cowes (Isle of Wight) Gas-Works.

Situations Wanted.

IN ENGINEERING WORKS BY YOUTH. No. 4003.
TRAVELLER GAS-STOVE TRADE. W. W., Faversham.

Gas Appliances Business for Disposal.

ISON AND HEWS. Loughborough.

Plant, &c. (Second-Hand) for Sale.

CONDENSER. Redditch Gas-Works.
GAS COMPRESSOR (Keith's). Chappell, Huddersfield.
GAS ENGINE AND EXHAUSTER, &c. Lurgan Gas Company. April 6.
HYDRAULIC MAIN, VALVES, &c. Bridport Gas Company.
PHOTOMETER. Wallingford Gas-Works.

Plant (Second-Hand) Wanted.

ENGINE AND EXHAUSTER. British Cyanides Company, Oldbury.
PURIFIER AND EXHAUSTER, &c. No. 4000.

Sales of Stocks and Shares.

BARKING GAS COMPANY. March 28.
BRENTFORD GAS COMPANY. March 31.
GRAYS GAS COMPANY. March 31.
HASTINGS AND ST. LEONARDS GAS COMPANY. March 31.
REIGATE GAS COMPANY. March 31.
READING GAS COMPANY. April 9.
SOUTHEND WATER COMPANY. April 7.

Mortgage Bonds.

LONGWOOD GAS COMPANY.
SOUTH SHIELDS GAS COMPANY.

TENDERS FOR

Benzol.

MIDDLETON CORPORATION. Tenders by April 8.

Cement and Bricks.

STOCKTON-ON-TEES. Tenders by March 30.

Coal and Cannel.

ASHFORD GAS DEPARTMENT. Tenders by April 9.
BROUGHTY FERRY GAS COUNCIL. Tenders by April 3.
CATERHAM GAS COMPANY. Tenders by April 13.
CLONMEL GAS DEPARTMENT. Tenders by April 7.

Cookers and Fittings.

STOCKTON-ON-TEES. Tenders by March 30.

Engine, Boiler, and Exhauster.

BURNHAM GAS COMPANY. Tenders by April 14.

Fire-Clay Goods.

STOCKTON-ON-TEES. Tenders by March 30.

General Stores, Tools, &c.

STOCKTON-ON-TEES. Tenders by March 30.

Governor.

BURNHAM GAS COMPANY. Tenders by April 14.

Hot-Coke Conveyor.

COLNE GAS DEPARTMENT. Tenders by April 18.

Lift for Oxide.

MATLOCK GAS COMPANY. Tenders by April 8.

Lime.

MIDDLETON CORPORATION. Tenders by April 8.
STOCKTON-ON-TEES. Tenders by March 30.

Meters.

BURNHAM GAS COMPANY. Tenders by April 14.
MIDDLETON CORPORATION. Tenders by April 8.
STOCKTON-ON-TEES. Tenders by March 30.

Pipes and Fittings, &c.

BURNHAM GAS COMPANY. Tenders by April 14.
COLNE GAS DEPARTMENT. Tenders by April 18.
EAST GRINSTEAD GAS AND WATER COMPANY. Tenders by April 1.
KEIGHLEY GAS DEPARTMENT.
MIDDLETON CORPORATION. Tenders by April 8.
STRATFORD-ON-AVON. Tenders by April 1.

Purifiers and Purifier Grids.

MATLOCK GAS COMPANY. Tenders by April 8.
STOCKTON-ON-TEES. Tenders by March 30.

Retort Bench and Settings.

BEVERLEY GAS DEPARTMENT. Tenders by March 26.

Retorts.

STOCKTON-ON-TEES. Tenders by March 30.

Steel Joists, Roof, and C. I. Columns.

LEICESTER GAS DEPARTMENT. Tenders by March 28
MATLOCK GAS COMPANY. Tenders by April 8.

Sulphuric Acid.

MIDDLETON CORPORATION. Tenders by April 8.

Tar.

COLNE GAS DEPARTMENT. Tenders by March 31.

Tar-Extractor.

BURNHAM GAS COMPANY. Tenders by April 14.

Valves, Gauges, Brass Fittings, &c.

BURNHAM GAS COMPANY. Tenders by April 14.
MIDDLETON CORPORATION. Tenders by April 8.
STOCKTON-ON-TEES. Tenders by March 30.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

COPY FOR ADVERTISEMENTS for the "JOURNAL" should be received at the Office NOT LATER than TWELVE O'CLOCK NOON ON MONDAY, to ensure insertion in the following day's issue.

Orders for Alterations in, or Stoppages of, PERMANENT ADVERTISEMENTS should be received by the FIRST POST on SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in Advance. If credit is taken, the charge is 25s. a year.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, LONDON." Telephone: P.O. 1571a Central.

GAS PURIFICATION AND CHEMICAL COMPANY, LIMITED.

OXIDE OF IRON.

O'NEILL'S Oxide has a larger annual sale than all other Oxides combined.

SPENT OXIDE purchased in any district.

JOHN WM. O'NEILL, Managing Director,
160, 161, & 162, PALMERSTON HOUSE,
LONDON, E.C.

ANDREW STEPHENSON, AGENT. All communications RE OXIDE to the COMPANY as above.

WINKELMANN'S

"VOLCANIC" FIRE CEMENT.

Resists 4500° Fahr. Best for GAS-WORKS.

ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

HYDRATED OXIDE OF IRON.

PREPARED from Pure Iron.

Twice as Rich as Bog Ore.
Gives no Back Pressure.
The Cheapest in the Market.
Can be Lent on Hire.
Can be Exchanged for Spent Oxide.

READ HOLLIDAY AND SONS, LTD., HUDDERSFIELD.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E.

First-Class Award, Melbourne Exhibition, 1889, for WET AND DRY GAS-METERS, STATION METERS, AND GOVERNORS, PRESSURE-GAUGES, STREET LAMPS AND PILLARS, &c.

Telegraphic Addresses:
"Braddock, Oldham." "Metrique, London."

DUTCH OXIDE OF IRON.

EERSTE Hollandsche Yzererts Maaty (First Dutch Bog Ore Company, Ltd.), ROTTERDAM.

General Manager for England and Wales)—
CHARLES E. FRY, LEAMINGTON; and at Tower Chambers, Brown Street, MANCHESTER.

London Managers—
E. PADFIELD & CO., 96-98, Leadenhall Street, LONDON, E.C.

General Manager (for Scotland)—
J. B. MACDERMOTT, 11, Bothwell St., GLASGOW.

BROTHERTON & CO., LIMITED.

Offices: Commercial Buildings, LEEDS. Correspondence invited.

COAL GAS TAR wanted.

Gas Managers in Gloucester, Somerset, Worcester, Devon, Wilts, Hereford, Monmouth, and Glamorgan PLEASE NOTE. BEST PRICE offered, either on Fixed or Sliding-Scale Basis.

State Quantity to offer for Prompt and Forward Delivery.

The SHARPNESS CHEMICAL COMPANY, Tar Distillers, Sharpness Docks, GLOS.

OXIDE OF IRON.

FIRE CEMENT, PAINT, GAS COAL.

BALE & CHURCH, 5, CROOKED LANE, LONDON, E.C.

JOHN RILEY & SONS, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 Years. References given to Gas Companies.

AMMONIACAL LIQUOR wanted.
BROTHERTON AND Co., LTD., Ammonia Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA
SATURATORS and LEAD WORK for Sulphate of Ammonia Plants.
For REPAIRS or ALTERATIONS, ring up "0848 BOLTON," or Telegraph "SATURATORS, BOLTON."
Largest Practice and most Up-to-Date Works in Britain.
JOSEPH TAYLOR AND Co., CENTRAL PLUMBING WORKS, BOLTON.

SPECIAL PAINT FOR GAS-WORKS.
JOHN E. WILLIAMS AND CO.,
VICTORIA PAINT WORKS,
MANCHESTER.
Telegrams: "ENAMEL." National Telephone 1759.

PATENTS AND TRADE MARKS
PUBLICATIONS. "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 and 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

GAS TAR wanted.
BROTHERTON AND Co., LTD., Tar Distillers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

IT is worth your while to buy direct.
THE RELIANCE LUBRICATING OIL COMPANY 19 and 20, Water Lane, Great Tower Street, London, E.C., handle all kinds of Lubricating Oils, for Engines, Cylinders, Dynamos, Spindles, &c., Burning Oils, Solar Distillates, Carburetting Oils, and Spirits for Gas Making; Motor Oils, Fuel Oils, Animal, Fish, and Vegetable Oils, &c., for all purposes. Write for our "Trade Mark" Inkstand, sent free to customers. Non-customers, 2s. 6d. each. RELIANCE LUBRICATING OIL COMPANY, London, Glasgow, Newcastle-on-Tyne, &c. Established 1858. Telegraphic Address: "Subastral," London; A.B.C. Code used. Telephone No.: Avenue 8891.

SULPHURIC ACID for Sale.
BROTHERTON AND Co., LTD., Chemical Manufacturers. Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

PENNY-IN-THE-SLOT WORK.
H. GREENE & SONS, Ltd., are prepared to give QUOTATIONS to Gas Companies or Corporations for FITTING UP COMPLETE and CARRYING OUT the WORK in its entirety, either in Iron or Compo.
SURREY ENGINEERING WORKS, BLACKFRIARS ROAD, LONDON, S.E.
Telephone: 1693 HOP. Telegrams: "LUMINOSITY."

AMMONIACAL Liquor wanted by JOHN RILEY & SONS, Hapton, near ACCRINGTON.

STREET AND SHOP LAMPS AND LANTERNS.
MARK DUFFIELD & SONS (Established 200 Years), makers of Street and Shop Lamps to own Pattern and Design. Any description of Lamp made. Inquiries invited.
London Manager: EDWARD PADFIELD, West India House, 96 & 98, LEADENHALL STREET, E.C.
Telegraphic Address: "EUPATHY, LONDON."

TRAVELLER, with good connection in South Eastern Counties, lately representing good Firm, desires re-engagement. Excellent References. Age 27.
Address W. W., 83, Preston Street, FAVERSHAM.

WANTED, Agents in the principal cities of the United Kingdom, to sell FLEXIBLE BRAIDED GAS-TUBING, LAWN SPRINKLERS, and other Specialities. Good Commission allowed.
Apply to J. AMBOR, Hamburg, GERMANY.

WANTED, a good Stoker, used to Shovel Charging and Engine and Exhauster. Permanent situation to a reliable man.
Apply, by letter, stating Wages, Height, and Age, to Mr. ROBERT FISH, Gas-Works, East Cowes, ISLE OF WIGHT.

WANTED for a Gas Office 12 miles from London, a JUNIOR CLERK, who will be required to assist in the Quarterly Meter Inspection and Prepayment Collection.
Applications, with Reference, and stating Age and Salary, to be addressed to No. 4008, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Temporary First-Class DRAUGHTSMAN for a large Gas-Works in the South of England. Must be a steady and competent man.
Apply, stating Age, Experience, and Wages required, to No. 4007, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, in a Gas Company owning works abroad, a First-Class DRAUGHTSMAN, able to take out quantities and make detailed drawings. Knowledge of Metrical system necessary. One knowing French preferred.
Apply, stating Age, Experience, and Salary Expected, to H. W. F. care of Housekeeper, Drapers' Gardens, LONDON, E.C.

WANTED, immediately, Draughtsmen used to Elevating and Conveying Plants.
Apply to W. J. JENKINS & Co., LIMITED, Gas Engineers, RETFORD.

CLERK AND BOOK-KEEPER.
A YOUNG Man with a knowledge of Gas Companies' Accounts required in the Office of the Colombo Gas and Water Company, Limited, at Colombo, Ceylon. Salary £160 per annum in Gold.
Apply, by letter, stating Age, with *copies* only of Testimonials, to the SECRETARY, Colombo Gas and Water Company, Limited, Gresham House, LONDON.

SWINDON UNITED GAS COMPANY.
WANTED, an Assistant-Manager to take entire control of Distribution Department and act as Deputy Works' Manager as occasion arises.
Applicant must have had thorough and practical Experience in Gas Manufacture and Main and Service Laying, House-Fitting, &c.
Age not to exceed 35.
Commencing Salary £120 per annum. No House, &c.
Applications, stating Particulars and enclosing *copies* of Testimonials, to be sent to the undersigned not later than Saturday, April 4, 1903.
JOHN J. JERVIS,
Secretary.
Gas Company, Swindon, Wilts.

GAS-METERS wanted, old disused Wet. Copper Lamp Frames, Brass, Pewter, Tin, Zinc, Lead Ashes, Old Copper Electric Cable, &c., for Cash.
J. SMITH, Canal Road, BRADFORD.

WANTED, a Good Second-hand Gas- EXHAUSTER and ENGINE combined, capable of delivering from 2000 to 5000 cubic feet per hour against a pressure of 4 inches of water.
Quote lowest Price, and how soon same could be delivered, to THE BRITISH CYANIDES COMPANY, LIMITED, Oldbury, near BIRMINGHAM.

WANTED, a Second-Hand Purifier, 10 ft. square by 4 ft. 6 in. or 5 ft. deep, in good condition, with Valves and Connections; also a good Second-Hand EXHAUSTER, capable of passing 10,000 cubic feet per hour. Prices must be moderate.
Address, with full Particulars, No. 4000, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

THE Broughty Ferry Gas Council desire, before April 3 next, OFFERS for Scotch or English DROSS, Singles, Doubles, Trebles, &c.; also First-Class CANNELS and SHALES.
FORBES WADDELL,
Engineer and Manager.

A BARGAIN—Water-Cooled Condenser in perfect condition. Capacity 250,000 cubic feet per 24 Hours.
Address A. E. LAYTON, Gas-Works, REDDITCH.

FOR SALE, by private Treaty, Keith's Patent No. 3 GAS COMPRESSOR.
For Price, apply to F. CHAPPELL, F.A.I., Auctioneer and Valuer, 24, John William Street, HUDDERSFIELD.

TO BE SOLD—Purifiers, Two or Four, 10 feet square by 4 ft. 6 in. deep, planed Joints, Connections, and Overhead Girders.
Write J. WRIGHT, 181, QUEEN VICTORIA STREET, E.C.

PHOTOMETER.
FOR SALE—A Standard Letheby PHOTOMETER, by Alexander Wright and Co. Complete with Candle-Balance, Minute Clock, &c. Quite new.
Apply MANAGER, Gas-Works, Wallingford, BERKS.

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
J. F. BLAKELEY, Gas Engineer, Thornhill, DEWSBURY.

GAS ENGINE AND EXHAUSTER FOR SALE.
THE Lurgan Gas Company have a 3½-Horse Power GAS-ENGINE and a 10,000 cubic feet EXHAUSTER, with Connections, all in good order, FOR SALE.
Proposals will be received up to Ten o'clock a.m., on Monday, the 6th of April, 1903, by
FRED. W. MAGAHAN,
Secretary.

FOR SALE, Cheap, Four Capital lengths of Wrought-Iron HYDRAULIC MAIN, with Valves, Arch, and Dip Pipes, all in perfect Condition:
SIZES OF HYDRAULICS, ALL INSIDE DIMENSIONS.
18 in. by 18 in. by 9 ft. 6 in. long, ⊐, for Fives or Sixes, 8-inch Valve.
16 in. by 16 in. by 9 ft. 6 in. long, ⊐, for Fives, 8-inch Valve.
16 in. by 16 in. by 9 ft. long, ⊐, for Fives, 8 inch Valve.
16 in. by 16 in. by 8 ft. 9 in. long, ⊐, for Fives, 8-inch Valve.
Also Ash-Pans, Buckstays, Fire-Bars, &c., from Four Beds of Retorts dismantled.
For further Particulars, apply to J. H. CORNISH, Gas-Works, Bridport, DORSET.

GAS APPLIANCES, LIMITED, 47, FARRINGDON ROAD, LONDON, E.C.
THE above Business to be Sold as a GOING CONCERN, including Lease, Goodwill, and Fixtures. The Stock in Trade, amounting to about £1400, consists of General Gas Fittings, Globes, Chimneys, Burners, and Mantles—well bought, and in good condition.
The returns are upwards of £5000 at good profits. Rent £250 per annum (£215 let off). Lease several Years to run. A considerable portion of the Purchase Money may remain on approved security. Nearly 1000 first-class customers on books, about 70 of which are Gas Companies.
For further Particulars, apply to ISON AND HEWS, Metal Trades Valuers, LOUGHBOROUGH.

FOR SALE—Very good Gas Plant as under:—
PURIFIERS—Four 12 feet square, with 8-inch Centre-Valve and Connections. Planed Joints.
Kirkham WASHER-S RUBBER, 300,000 cubic feet per diem., with Engine and 8-inch Valves and Connections.
Livesey WASHER, 250,000 cubic feet per diem, with 8-inch Valves and Connections.
Photos. sent on application to SAML. WHILE AND SON, 60, Queen Victoria Street, LONDON, E.C.

GAS Plant for Sale, guaranteed per- fect—
RETORT IRONWORK, modern and various.
BOILER, Cornish, 4 ft. 6 in. by 14 ft. 6 in., 70 lbs.
CONDENSERS, 4-inch, 6-inch, and 8-inch, and Patent types.
EXHAUSTERS and ENGINES in duplicate up to 12-inch Connections.
"LIVESEY" WASHERS up to 10-in. Connections.
"HOLMES" WASHERS, 10-inch or 12-inch Connections.
PURIFIERS, several Sets up to 20 feet square.
METERS and GOVERNORS, 4-in. to 12-in. sizes.
GASHOLDERS, 7000, 9000, 25,000, & 30,000 capacity.
All Plant supplied guaranteed good, sound, and satisfactorily erected. Catalogues of New Apparatus and References an application.
J.F.B. & Co. are the largest buyers of discarded Gas Apparatus.
J. FIRTH BLAKELEY & Co., Gas Engineers and Contractors, Thornhill, DEWSBURY.

MATLOCK AND DISTRICT GAS COMPANY, LIMITED.
THE Directors of the above Company invite TENDERS for the supply and erection of four 20 feet PURIFIERS, CONNECTIONS, STEEL ROOF, and LIFT for OXIDE.
Further Particulars and copy of Specification may be obtained on application to the Manager at the Works.
Sealed Tenders, endorsed "Tender for Purifiers," to be lodged with the undersigned on or before the 8th day of April, 1903.
The Directors do not bind themselves to accept the lowest or any Tender.
ROBERT HALL,
Secretary.
Matlock, March 20, 1903.

THE Corporation of Middleton are pre- pared to receive TENDERS for SUNDRY STORES for the Year ending the 31st of March, 1904, consisting of the following:—
LIME, VITRIOL, METERS, BRASS MAIN COCKS, TUBES and FITTINGS, OILS (Gas-Engine, Cylinder, Engine, Boiled, Exhauster, and Conveyor Lubricant), and BENZOL.
Further Particulars, Specifications, and probable quantities may be obtained on application to Mr. E. E. J. Anderson, M.I.M.E., Gas Engineer.
Tenders, addressed to the Chairman of the Gas, &c., Committee, endorsed "Tenders for Sundry Stores" or "Benzol," as the case may be, must be delivered at my Office on or before Wednesday, the 8th of April next.
The Corporation do not bind themselves to accept the lowest or any Tender.
FREDERICK ENTWISTLE,
Town Clerk.
Town Hall, Middleton,
March 20, 1903.

STOCKTON-ON-TEES CORPORATION.
(GAS DEPARTMENT.)
TENDER FOR STORES, &c.
THE Gas Committee are prepared to re- ceive TENDERS for the supply of the following MATERIAL from April 3, 1903, to March 31, 1904:—

1.—Cookers and Fittings.	12.—Cartage.
2.—Meters and Fittings.	13.—Brushes.
3.—Lime for Purification	14.—Bolts, Nuts, Screws, and Rivets.
4.—Bricks (Ordinary).	
5.—Cement.	15.—Glass, Putty, &c.
6.—Fire-Clay Goods, Retorts, &c.	16.—Tools, &c.
	17.—Shovels, Picks, Forks, &c.
7.—Brass Fittings, Castings, &c.	18.—Timber, Purifier Grids, &c.
8.—Lead, Compo., Tin, Block Tin, Red and White Lead, &c.	19.—Rubber, Leather, and Asbestos Goods.
9.—Steam Tubes and Fittings.	20.—Ironmongery.
	21.—Canvas.
10.—Paints, Oils, Dryers, Enamels, &c.	22.—Iron and Steel Bars, Sheets, and Plates.
11.—Lubricating Oils, Tallow, Grease, &c.	23.—Castings, &c.

Forms of Tender and all further Information may be obtained on application to the undersigned.
No Form of Tender other than that issued by the Committee will be accepted.
Tenders, endorsed "1, 2, 3, &c.," as the case may be, addressed to the undersigned (together with samples), to be sent in on or before noon on March 30, 1903.
The Gas Committee do not bind themselves to accept the lowest or any Tender.
By order,
WM. FORD,
Manager.
Corporation Gas-Works, Thompson Street,
Stockton-on-Tees, March 19, 1903.

KEIGHLEY CORPORATION GAS-WORKS.

THE Gas Committee invite Tenders for the supply of 12-inch and 15-inch diameter CAST-IRON SOCKET PIPES.

Particulars and Form of Tender supplied on application to

JOHN LAYCOCK,
Gas Engineer.

Gas Offices, Cook Lane,
Keighley, March 16, 1903.

TO IRONFOUNDERS.

THE Gas Committee of the Colne Cor- poration invite TENDERS for the supply of 14 Tons of 10-inch, and 46 Tons of 12-inch Socket and Spigot GAS-PIPES, delivered at Colne Station.

Particulars can be obtained from the undersigned, to whom Tenders must be addressed and delivered, endorsed "Cast-Iron Pipes," on or before April 18, 1903.

The Committee do not bind themselves to accept the lowest or any Tender.

FRED. THORPE,
Engineer and Manager.

Gas-Works, Colne, Lancashire.

CORPORATION OF CLONMEL.

(GAS DEPARTMENT.)

TENDERS FOR GAS COAL.

THE Gas Committee of the above-named Corporation are prepared to receive TENDERS for the supply of about 3000 Tons of Durham or any other good GAS COAL, free from Sulphur, Bats, Bind, Refuse, and Dirt; the Coal to be delivered in Waterford as required over the period between the date of declaration of the Contract and the 30th of June, 1904.

Tenders to state prices for delivery by steamers and sailing ships respectively; the latter to be discharged at the rate of 30 Tons per working day.

The Committee reserve the right to accept Tenders for the whole or any portion of the quantity offered, and do not bind themselves to accept the lowest or any tender.

Sealed Tenders, endorsed "Tender for Gas Coal," to be delivered on or before the 7th of April, 1903, addressed to the Secretary, Gas-Works, Clonmel.

Gas Offices, Clonmel,
March 16, 1903.

CORPORATION OF LEICESTER.

SECTION No. 1, CONTRACT No. 74—
ROLLED STEEL JOISTS, &c.
SECTION No. 1, CONTRACT No. 75—
CAST-IRON COLUMNS.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive separate TENDERS for the supply and delivery of ROLLED STEEL JOISTS and CAST-IRON COLUMNS, required at their Aylestone Road Works.

Drawings may be seen, and Specifications and Forms of Tender obtained upon application to the Engineer, and on payment of the sum of £5 (which amount will be returned upon receipt of a *bonâ-fide* Tender).

Tenders, addressed to Mr. Councillor Edwards, Chairman, and endorsed "Tender for ———," to be delivered at these Offices not later than Eleven o'clock a.m. on Saturday, March 28, 1903.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E., M.Inst.E.E.,
Engineer and Manager.

Offices: Millstone Lane, Leicester,
March 12, 1903.

EAST GRINSTEAD GAS AND WATER COMPANY.

THE Board of Directors of the above- named Company are desirous of receiving TENDERS for the supply of the under-mentioned GAS-PIPES, Coated with Dr. Angus Smith's Solution.

About 3500 yards of 7-inch Pipes.
" 3500 " 6 " "
" 1200 " 4 " "
" 1600 " 3 " "

at per Ton delivered at East Grinstead and Forest Row Stations, L.B. & S. C. Railway, as required.

Any further Information can be obtained of the Gas Manager, Mr. D. T. Livesey, at the Works, London Road, East Grinstead.

Tenders are requested to be sent to the undersigned on or before the 1st day of April next.

The Directors will not be bound to accept the lowest or any Tender.

EVELYN ALSTON HEAD,
Secretary.

6, High Street, East Grinstead,
March 16, 1903.

THE Directors of the Burnham (Somer- set) Gas Company invite TENDERS for the following NEW PLANT—viz.:

1.—ENGINE and EXHAUSTER, coupled together.
2.—TAR-EXTRACTOR, 9-inch Valve and Pressure Gauge.
3.—Egg-End STEAM-BOILER and all Mountings.
4.—9-inch Yard MAINS and SPECIALS and HOLDER VALVES.
5.—STATION METER and VALVES and PRESSURE GAUGE.
6.—STATION GOVERNOR and PRESSURE GAUGES and VALVES.
7.—About 400 Yards of 9-inch Cast-Iron MAIN PIPE and SPECIALS.

The Drawings and Specification may be seen, and any further Particulars obtained, from J. H. Cornish, Gas-Works, Bridport, Dorset.

The Directors do not bind themselves to accept the lowest Offer, and reserve to themselves the right of accepting the whole or any portion of Tenders sent in.

Tenders, endorsed "Contract No. 4," are to be delivered on or before April 14, 1903, to J. Cox, Esq., Secretary, Gas Company, Alexandra Terrace, Burnham, SOMERSET.

BOROUGH OF BEVERLEY.

THE Gas Committee of the above Borough invite TENDERS for the Work and Material required in the erection of a RETORT-BENCH, and RETORT-SETTINGS on the Regenerative System, with all the necessary Furnace Fittings Bench Mountings, &c.

Particulars can be obtained from the Gas Manager, Mr. F. W. Oldfield, at the Gas-Works, and Tenders must be delivered at my Office not later than the 26th of March, 1903, at Ten a.m.

J. WILLIS MILLS,
Town Clerk.

ASHFORD (KENT) URBAN DISTRICT COUNCIL.

TENDERS FOR GAS COAL.

THE Lighting Committee are prepared to receive TENDERS for the supply of at least 6000 Tons of good GAS COAL.

Forms of Tender and other Information can be obtained on application from J. Morton, Manager, Gas-Works.

Tenders, endorsed "Coals," must be delivered on or before Thursday, April 9, 1903, at my Office, No. 11, Bank Street, Ashford, Kent.

JOHN CREERY,
Clerk.

March 21, 1903.

BOROUGH OF COLNE.

THE Gas Committee invite Tenders for the supply and erection complete of a HOT-COKE CONVEYOR at their Gas-Works, Knotts Lane, Colne.

Plans can be inspected on and after March 25 next; and any further Particulars can be obtained from the undersigned.

Tenders, endorsed "Conveyor," must be addressed to the Chairman of the Gas Committee, Gas-Works, Knotts Lane, Colne, and delivered not later than April 18, 1903.

FRED THORPE,
Engineer and Manager.

Gas-Works, Colne,
Lancashire, March 20, 1903.

BOROUGH OF COLNE.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the surplus TAR made at their Works during the Twelve Months ending March 31, 1904.

Particulars may be obtained on application to the undersigned.

Sealed Tenders, endorsed "Tar," must be addressed to the Chairman of the Gas Committee, Gas-Works, Knotts Lane, Colne, Lancashire, and delivered not later than Tuesday, March 31, 1903.

The highest or any Tender not necessarily accepted.

FRED. THORPE,
Engineer and Manager.

Gas-Works, Colne,
Lancashire, March 6, 1903.

STRATFORD-UPON-AVON CORPORATION.

(GAS DEPARTMENT.)

THE Gas Committee invite Tenders for the supply of about 800 yards of 16-inch CAST-IRON MAINS, Spigot and Socket Joints, 12 feet lengths, coated and tested, and delivered free on the Gas-Works Siding, G.W. Rly. Company, Stratford-upon-Avon, in such quantities as may be required.

The Committee reserve the right to accept the lowest or any Tender.

Tenders to be sent in not later than Wednesday, April 1, 1903, endorsed "Tender for Mains," and addressed to Mr. Robert Lunn, Town Clerk, Stratford-upon-Avon.

J. S. CRANMER,
Manager.

March 20, 1903.

TENDERS FOR COAL.

THE Directors of the Caterham and District Gas Company invite TENDERS for the supply of about 4000 tons of unscreened GAS COAL, to be delivered f.o.r. at their Siding during the Twelve Months ending June 30, 1904.

Sealed Tenders, endorsed "Tender for Coal," and addressed to the Chairman, Gas-Works, Whyteleafe, Surrey, to be delivered on or before Monday, the 13th of April, 1903.

The Directors do not bind themselves to accept the lowest or any Tender.

Particulars as to monthly deliveries and other information may be obtained from the undersigned.

By order of the Board,
D. H. ANDERSON,
Engineer and Secretary.

Offices: Gas-Works,
Whyteleafe S.O., Surrey.

READING GAS COMPANY.

ISSUE OF DEBENTURE STOCK BY TENDER.

NOTICE is Hereby Given, that the Reading Gas Company Offer for SALE BY TENDER £14,344 FOUR PER CENT. DEBENTURE STOCK, being a portion of the Additional Capital Authorized to be raised under the Reading Gas Act, 1902; and the Directors will be prepared to receive sealed Tenders, not later than Twelve o'clock noon, on Thursday, the 9th day of April, 1903.

By the Trustee Act, 1893, it is provided that a Trustee having power to invest in the Mortgages or Bonds of a Company may, unless the contrary is expressed in the instrument authorizing the investment, invest in the Debenture Stock of such Company.

Particulars and Conditions of Sale, with printed Form of Tender, can be obtained on application to the Secretary.

By order,
ARTHUR H. CANE,
Secretary.

7, King Street, Reading,
March 10, 1903.

ISSUES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his ISSUES by AUCTION under PARLIAMENTARY POWERS of STOCKS and SHARES in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.

Terms for Issuing such Capital, and also for including Gas and Water Stocks and Shares belonging to Private Owners in these Periodical Sales, can be obtained on application at Mr. ALFRED RICHARDS' OFFICES, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
HASTINGS AND ST. LEONARDS GAS COMPANY.

NEW ISSUE OF £10,000 NEW ADDITIONAL FIVE PER CENT. ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 31, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
GRAYS GAS COMPANY, LIMITED.

NEW ISSUE OF 400 £10 "B" SHARES.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart, E.C., on Tuesday, March 31, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Executors of Mrs. Banks, deceased, and others.
THE BRENTFORD GAS COMPANY.
£2220 CONSOLIDATED STOCK.
THE REIGATE GAS COMPANY, LIMITED.
£500 ORDINARY STOCK.

MR. ALFRED RICHARDS will Sell the ABOVE BY AUCTION, at the Mart E.C., on Tuesday, March 31, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the
SOUTHEND WATER-WORKS COMPANY.

NEW ISSUE OF 3000 £10 NEW ORDINARY FIVE PER CENT. MAXIMUM SHARES.

MR. ALFRED RICHARDS will sell the ABOVE BY AUCTION at the Mart, E.C., on Tuesday, April 7, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

LONGWOOD GAS COMPANY.

ISSUE OF 3½ PER CENT. MORTGAGE BONDS.

THE Directors are prepared to receive APPLICATIONS for £8000 MORTGAGE BONDS, at the above rate, less Income-Tax, in multiples of £100, for a term of not less than Three Years, repayable at any time after that period by Six Months' Notice on either side.

Interest payable Half-Yearly, on the 30th of June and the 31st of December in each Year.

Applications will be accepted in the order in which they are received.

J. H. BREARLEY,
Secretary.

Gas Offices, Longwood,
Huddersfield, March, 1903.

SOUTH SHIELDS GAS COMPANY.

ISSUE OF 3½ PER CENT. MORTGAGE BONDS.

THE Directors are prepared to receive APPLICATIONS for £10,000 MORTGAGE BONDS, at the above rate, less income-tax, in multiples of £100, for a term of not less than Three Years, repayable at any time after that period by a Six Months' Notice on either side.

Interest payable Half Yearly, on the 30th of June and the 31st of December in each year.

Applications will be accepted in the order in which they are received.

J. H. PENNEY,
Secretary.

Gas Offices, Chapter Row,
South Shields, March, 1903.

BARKING GAS COMPANY.

INCORPORATED BY ACTS OF PARLIAMENT 1867 and 1903.

SALE BY TENDER OF 1800 ORDINARY SHARES OF £10 EACH,

Entitled to a Maximum Dividend of Seven per Cent. per Annum.

NOTICE is Hereby Given, that it is the intention of the Directors of this Company to SELL by TENDER, 1800 of the above, being a portion of Additional Capital authorized to be raised by Resolution passed at an Extraordinary General Meeting of the Proprietors held on the 28th day of January, 1903, under the Powers of the above-mentioned Act.

Particulars and Conditions of Sale and Form of Tender may be obtained on application at this Office, and sealed Tenders must be sent in not later than Five o'clock in the afternoon of Saturday, the 28th day of March, 1903.

By order of the Directors,
STUART MORRIS,
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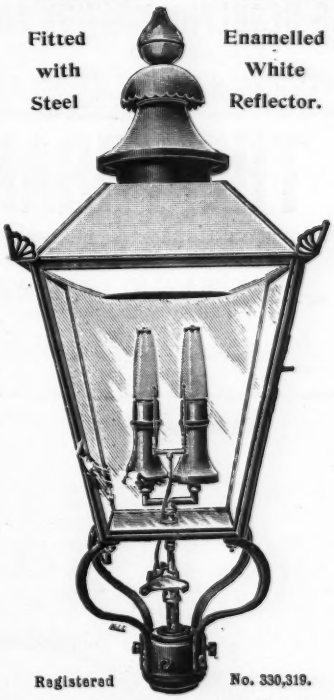

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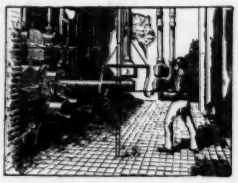

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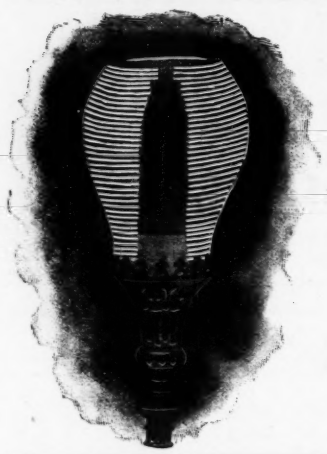

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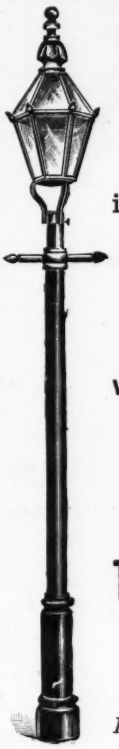

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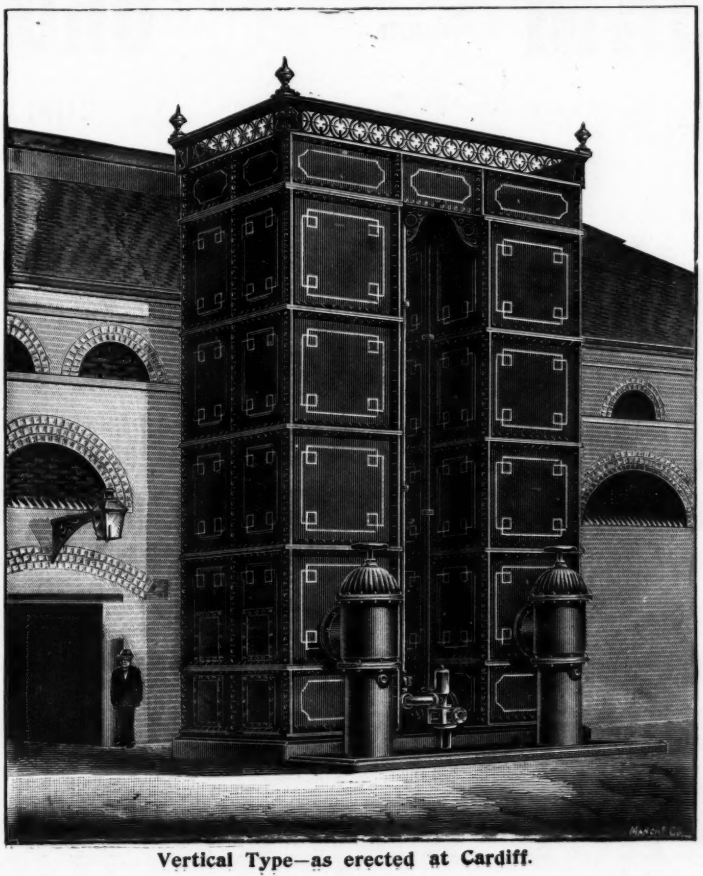

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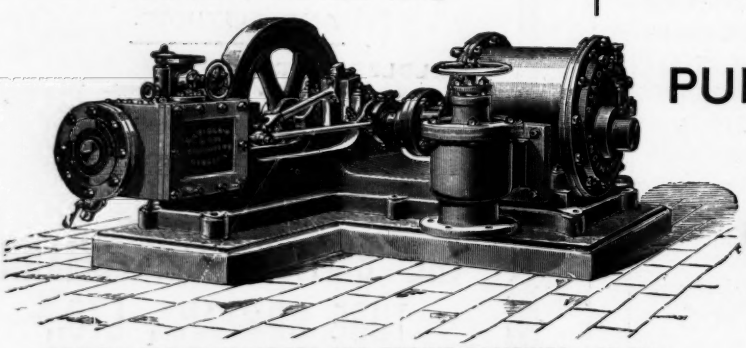

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